EDISON
ELECTRIC INSTITUTE
BULLETIN

JULY, 1937

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EDISON ELECTRIC INSTITUTE

STATISTICAL DATA OF THE ELECTRIC LIGHT AND POWER INDUSTRY

Compiled Monthly by the Edison Electric Institute—Covers 100% of the Industry

DURING THE MONTH OF APRIL

	1937	1936	%
Kilowatthours Generated* (net)			
By Fuel	5,476,238,000	4,616,385,000	+18.6
By Water Power	3,859,251,000	3,640,805,000	+ 6.0
Total Kilowatthours Generated	9,335,489,000	8,257,190,000	+13.1
Additions to Supply			
Energy Purchased from Other Sources	326,306,000	159,580,000	104.5
Net International Imports	108,922,000	84,645,000	+28.7
Total	435,228,000	244,225,000	+78.2
Deductions from Supply			
Energy Used in Electric Railway Departments	46,933,000	47,460,000	− 1.1
Energy Used in Electric and Other Departments	139,533,000	116,965,000	+19.3
Total	186,466,000	164,425,000	+13.4
Total Energy for Distribution	**9,584,251,000**	**8,336,990,000**	**+15.0**
Energy Lost in Transmission, Distribution, Etc.	**1,313,866,000**	**1,267,563,000**	**+ 3.7**
Kilowatthours Sold to Ultimate Consumers	**8,270,385,000**	**7,069,427,000**	**+17.0**
Sales to Ultimate Consumers (kwhrs)			
Domestic Service	1,418,315,000	1,222,513,000	+16.0
Commercial—Small Light and Power (Retail)	1,465,882,000	1,280,681,000	+14.5
Commercial—Large Light and Power (Wholesale)	4,672,394,000	3,842,073,000	+21.6
Municipal Street Lighting	161,532,000	192,803,000	−16.2
Railroads—Street and Interurban	367,295,000	375,256,000	− 2.1
Railroads—Electrified Steam	111,269,000	86,218,000	+29.1
Municipal and Miscellaneous	73,698,000	69,883,000	+ 5.5
Total Sales to Ultimate Consumers	8,270,385,000	7,069,427,000	+17.0
Total Revenue from Ultimate Consumers	$177,860,900	$165,702,900	+ 7.3

DURING TWELVE MONTHS ENDING APRIL 30th

Kilowatthours Generated* (net)			
By Fuel	71,696,660,000	59,379,451,000	+20.7
By Water Power	38,513,723,000	36,982,155,000	+ 4.1
Total Kilowatthours Generated	110,210,383,000	96,361,606,000	+14.4
Purchased Energy (net)	3,621,737,000	3,226,187,000	+12.3
Energy Used in Electric Railway and Other Departments	2,123,360,000	2,183,556,000	− 2.8
Total Energy for Distribution	**111,708,760,000**	**97,404,237,000**	**+14.7**
Energy Lost in Transmission, Distribution, Etc.	**17,648,807,000**	**16,517,510,000**	**+ 6.8**
Kilowatthours Sold to Ultimate Consumers	**94,059,953,000**	**80,886,727,000**	**+16.3**
Total Revenue from Ultimate Consumers	**$2,109,567,400**	**$1,949,177,600**	**+ 8.2**
Important Factors			
Percent of Energy Generated by Waterpower	34.9%	38.4%	
Domestic Service (Residential Use)			
Average Annual Consumption per Customer (kwhr)	748	692	+ 8.1
Average Revenue per Kwhr (Cents)	4.60¢	4.90¢	− 6.1
Average Monthly Bill per Domestic Customer	$2.86	$2.83	+ 1.1

BASIC INFORMATION AS OF APRIL 30th

Generating Capacity (kw)—Steam	24,136,183	23,974,800	
—Waterpower	9,531,513	9,011,400	
—Internal Combustion	616,424	498,700	
Total Generating Capacity in Kilowatts	34,284,120	33,484,900	
Number of Customers			
Farms in Eastern Area (Included with Domestic)	(813,628)	(589,490)	
Farms in Western Area (Included with CommercialLarge)	(290,028)	(219,298)	
Domestic Service	21,925,392	21,189,020	
Commercial—Small Light and Power	3,835,692	3,773,275	
Commercial—Large Light and Power	550,996	491,365	
Other Ultimate Consumers	73,141	63,916	
Total Ultimate Consumers	26,385,221	25,517,576	

* By courtesy of the Federal Power Commission, with deductions for certain plants not considered electric light and power enterprises.

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume 5 JULY, 1937 No. 7

Opportunities for Youth in the Electric Utility Industry

By H. P. Liversidge

Vice-President and General Manager, Philadelphia Electric Company

An address before the Second General Session of the Fifth Annual Convention of the Edison Electric Institute, Chicago, Illinois, June 2, 1937

TWENTY-FIVE years ago a young man with an engineering education accepted as a foregone conclusion the fact that one of the most desirable openings for him was in the electric light and power industry. This, in many cases, was his first choice. Furthermore, he usually was influenced in this decision not only by the advice of his teachers but by a very definite knowledge of the rapidity with which the industry was growing. Frequent announcements of startling technical developments cast almost a romantic spell over the scene. Opportunities in this broad field of public service were clamoring for the youth to grasp. But that was twenty-five years ago. After a quarter of a century of development, well may the question be asked: What is the opportunity today and tomorrow for the young man in the electric utility industry?

I have no desire to pose as a crystal-gazer, nor do I wish to make any prophetic guesses as to what the future of the industry offers. There are too many variables in the picture to permit anyone to make a definite statement.

I can see but one safe way to give the semblance of a reasonable answer to youth and that is to assume certain premises as a basis for our forecast and proceed from there. It is not enough for us to estimate the opportunities that should follow the logical expansion of the industry. We must take into consideration the trend of public opinion and the attitude of government toward the industry if we are to be in a position to counsel with youth. The problem is further complicated because we must assume a certain knowledge of what the youth of today and tomorrow really desires—what he wants—what he considers real opportunity; and what he is willing to give in return for these opportunities.

MR. LIVERSIDGE

There is no doubt that the youth of the present day is subjected to a flood of oral and printed propaganda criticizing electric utilities, condemning their policies and practices specifically and in general. Add to all this the misinformation promulgated and the snap judgment expressed by some of those who should be endeavoring to guide him to a correct understanding of these matters, and there can be little doubt that he must be in a more or less demoralized frame of mind with regard to our business. It is little wonder, therefore, that ambitious young men hesitate to enter the industry, questioning just what is ahead.

In addition to this, when we consider the forced development of certain power projects which the Federal government either proposes to build or actually owns and is now operating in direct competition with already existing private utilities, it is not at all surprising that common sense should dictate caution to the young man contemplating a start in the electric utility industry. Actually, I have heard men who have risen to great responsibility in this industry express doubt of their entering the business if they were beginning their careers at the present time. And while we may disagree with their conclusions, we cannot disregard the fact that they have some justification in fearing the extent to which socialization of the industry may be carried.

Now what are the facts? Let us admit that in the past there have been abuses that sorely needed correction. Yet these abuses which we ourselves roundly condemn and which already have been largely eliminated, are really insignificant in the face of the honest effort exerted by the large majority in the industry toward the betterment of electric service and toward the reduction of its cost to the consumer. Rates have been revised uniformly downward, even in periods of rapidly rising costs of living so that the American people are today receiving more for their electrical dollar than for dollars spent for any other commodity. No nation in the world even approaches

the United States in the wide availability of electric service. This has been accomplished through the traditional American system of encouraging individual enterprises under suitable regulation and control.

I doubt if we would have enjoyed this phenomenal expansion were it not for the fact that the industry has been in private hands—yes, and under the maligned profit system. Speaking of the profit system, I cannot forbear mentioning the homely fact that so long as the profit motive exists in this country, just so long will enterprise be measured by an economic yardstick. We may theorize to our hearts' content and draw glowing pictures of an era of production for use and not for profit, but, human nature being what it is, when a nation pursues any plan in which profit is eliminated, it will find itself building up a loss that ultimately must prove a hardship to the very public it was endeavoring to benefit. Thus we may draw the obvious conclusion that if these recent competitive projects of our government are economically unsound, and certainly in the light of cold facts some of them give evidence of incurring serious economic losses, it should not be long before we shall know the truth.

To be sure, today, under political stimulation and unusually wide publicity, we are witnessing a furtherance of public ownership of utilities. I cannot believe, however, that the situation in this country constitutes anything but a temporary interruption of a sensible, long-term trend under private ownership.

The great bulk of the industry for many sound reasons too numerous to recite here will remain under private ownership unless we as a nation lose the last vestige of initiative and enterprise and settle down to the dull monotony of a regimented existence.

In the future, in a more co-operative atmosphere, I am confident we shall see a marked lessening of the unreasoning antagonism which today stands as a great barrier between government and business. Thus we should expect to find a greatly improved mutuality of understanding: on the part of the industry, an even greater appreciation of its responsibility to the consumer; on the part of the public, a better realization of the true value of this great service—what it means to the individual and to the well-being of the nation as a whole.

I certainly would not have taken the trouble to prepare a statement covering the future opportunities in our industry did I not feel that the present confusion soon will end. With this premise, I think we may safely examine the present status of the industry and the opportunities for youth which it offers.

In the first place, the industry is relatively young. Its rapid recovery from the depression, its rapidly increasing output, its new engineering accomplishments attest to its virility. True, it is no longer an infant industry, but it is far from even approaching full growth. There is still a great deal of major pioneering to be done and the spirit of the industry is still the spirit of progress.

The industry is basic. It plays a fundamental part in almost everyone's life. Electric energy is cheap, it is convertible into almost any other form of energy, and it is capable of economic distribution. There is no rival in sight to challenge its basic importance. So long as the industry fully recognizes its responsibilities in supplying this great universal service, strives to make it more reliable, less expensive, and more adaptable to the users' needs, it is certain to gain in public confidence. But to do these things, to keep its horizon broad and its spirit progressive, it must have a continuing influx of ambitious, able young men. Believe it or not, the industry will continue to attract young men only so long as young men continue in the industry. By young men I mean those who regardless of age continue to press forward, not satisfied with things as they are, but are eager to find better ways of doing things.

One of the inherent traits of human nature is the tendency to take for granted that which now exists. I know through observation and experience that such a stand-pat, self-satisfied attitude is seldom encountered in the electric industry. The continued progress of the industry is strong evidence of the forward-looking point of view that pervades almost every phase of activity, and leads to continuous scrutiny of methods, materials, and operations in an unremitting effort to find more effective and more economical means of operating. The record of the industry is indisputable proof of its progress-consciousness.

By force of illustrations, some of which may seem fanciful to you, I want to press home the fact that unlimited opportunities for progress and improvement in the industry still lie open. In citing these illustrations, I am not taking the role of a prophet, but merely wish to bring to you, and to the younger men who are examining the opportunities our industry offers them, a full realization of some of the potentialities and problems ahead. For these illustrations I am drawing first upon the engineering and technical field because this has always been and always will be basically important in our business. Of equal importance, however, are the broad fields of opportunity in sales, accounting and legal work of which more will be said later.

In power generation from fuel, although tremendous strides have been made during the last decade or so in raising the thermal efficiency of our best steam plants to the order of 30 per cent, there still obtrudes the impressive fact that about 70 per cent of the energy of the fuel is not converted into electricity. I do not mean to minimize the magnitude of the latest achievements in high pressure and high temperature steam generation, in the use of mercury, in the development of enormous steam boiler units, the improved methods of combustion, and in the remarkably high efficiencies of boilers, turbines and generators as individual units. Although some of us, through familiarity, may consider the 70 per cent loss inevitable, I am sure many young engineers will accept the challenge of this problem which sooner or later, I am confident, will be solved. None of us here can predict whether the solution will come from some new high temperature, high pressure cycles which increase available heat, or from chemical processes as yet undeveloped, or through the development of entirely new types of prime movers. Probably the solution will be an outgrowth of research in several diverse fields of science.

This possibility of improved efficiencies for steam plants, scarcely recognized by the lay mind, raises an interesting question—particularly pertinent in relation to our tremendous governmental program—in the development of hydro projects throughout this country. With the most important large hydro-electric projects that are susceptible of economic development already built, and with the modern steam stations now showing lower over-all costs than any but the most favorably located hydro plants, the question naturally arises: What will be the situation with respect to hydro plants now being built with public funds if steam plant efficiencies increase from the present over-all figure of, say, 30 per cent to 40 or 50 per cent? It may very well be that the importance of a large part of our present projected hydro-electric development will be seriously affected by the next major advance in fuel generation station efficiencies. From an eco-

nomic viewpoint no further improvement of importance can be made in hydro plants; the production of electricity by steam, on the other hand, is still in swaddling clothes. Draw your own conclusions!

Let us examine for a moment some of the interesting probabilities, perhaps certainties, that would result from really high efficiency generation. First, it may break the present strong bond that ties large steam generating plants to locations where there is a plentiful supply of circulating water. With most of the energy of the fuel converted into electrical energy, water requirements may dwindle into insignificance. Greater freedom in the selection of generating station sites would permit locations much near the loads served, with consequent savings in transmission and greater service reliability, particularly if the size of the generating plants could be greatly decreased from the enormous concentrations of capacities now prevailing.

The apparatus and methods now in vogue for transmission of electric current often accounts for a large percentage of total plant investment, which is partly an outgrowth of the concentration of generating capacity to which I referred and partly due to limitations of circuit breakers and other apparatus. Although much has been done in the application of electronic tubes to the transmission of power, the possibilities of ultimate development in this field have hardly been touched. Perhaps many of us take for granted the permanence of alternating current power transmission, just as a few decades ago exponents of direct-current distribution maintained that direct current was the ultimate for adequate service to the customer. When low-cost electronic tubes and other equipment for direct-current transmission become available—and actual installations have been in successful operation for several years—engineers may find themselves revamping many of the substations of which we are now so proud. The enormous transformers and circuit breakers that we now take for granted may become as extinct as the cable car, or become so shrunken in size, due to the genius of engineers possibly graduating from school this very month, as to be wholly unrecognizable a few years hence.

Though the foregoing illustrations may seem to be somewhat fanciful to men long in the industry, let me warn you that young men will not always take the same view. Some young man will tackle the apparently impossible. History shows that most progress has been made by young men tackling the "unsolvable" problems and licking them.

I want to supplement these long-range views with illustrations of more immediate problems confronting the engineer to convince the young man that there is plenty "on the table" to challenge his ingenuity.

System planning in its broadest aspects is being given increasing attention by almost every operating company in order that extensions, particularly of generating and transmission plant, may be made in the most orderly, economic manner in sufficient time, yet not unduly anticipating actual need. System planning involves most interesting analyses of sales and other forecasts and the examination of various methods of plant development in order to determine the best engineering solution. By determining the best engineering solution I mean engineering in its broadest sense, considering both capital and operating economies, trends of load growth, best utilization of existing plant, and last, but not least, service reliability.

More on the technical side there are many problems as yet unsolved or partly solved which beckon to the more scientific type of man. Problems in the technical field range over almost innumerable subjects, including problems of metals subjected to high pressure and high temperature, combustion and corrosion problems; and in the electrical end, the many intricate problems, having to do with system stability, circuit breaker performance, insulation, lightning, and protective relays.

I do not wish to overlook the many problems encountered in every-day operations of our vast systems, analysis of operating interruptions and the diagnosis of failures of equipment and lines. These, if properly analyzed, are sources of extremely valuable information from which improvements in operating and design practices often develop. Very frequently data available from searching analyses of operating troubles and records provide the clinching facts in a choice between alternate plans.

Although considerable attention has been given to making the greatest possible use of expensive equipment, there are still enormous potential savings in the operation of equipment and lines at ratings fully recognizing the relation between frequency of equipment outage, characteristics of loads, and their actual effect on the integrity of the equipment. We have definitely broken away from blind acceptance of "name-plate" ratings as operating limits, but there is much work to be done in securing the maximum possible economies in this direction. This again is a young man's job under the responsible guidance of the experienced operator or engineer.

As a servant of the public, the electric utility can never lose sight of the dollars-and-cents aspect of its business—of the fundamental economic principles which dictate sound business policy regardless of the product manufactured and sold. Experience has shown that the growth of the electric industry on a sound financial basis, bringing with it increased public service at lowest possible cost, calls for intensive sales activities.

The industry must push its product in much the same way as do manufacturers in competitive non-regulated industries. In earlier days the industry first increased its business and then lowered rates. Today, it is lowering rates and then through intensive sales campaigns building up its load in order to restore the revenues which are lost when rates are decreased. This means that sales plans must be prepared by experts in marketing research. For this reason, many authorities believe that by far the best opportunities in the utilities' field are to be found in the sales end of the business.

A specific part of this field for the young man or woman is in the advertising and sales promotion end. A certain amount of technical knowledge and training is necessary, and I have found that an increasing number of younger people are interested in this field, offering as it does the opportunity to work with the home, the commercial and industrial customer, which is perhaps a wider opportunity than that found in some other businesses.

There is a need for people of imagination to develop merchandising programs, advertising men to present our wares to the public and sales executives and salesmen who can successfully put these plans into operation. We are still far from making full use of proper and adequate lighting standards. On the farm there are more than 150 uses of electricity which provide a field for further economic development. Air conditioning for residences and commercial establishments offers vast possibilities and is just beginning to take its place as one of the important services of the future. For young men who like selling and who become thoroughly acquainted with the business through suitable training and experience,

the electric industry offers many wonderful opportunities.

With the electric industry continuing to grow as I picture it growing and with the requirements of finance and regulatory bodies becoming more exacting as time goes on, I anticipate many broad opportunities for the lawyer and the accountant. Furthermore, in an industry of the size and complexity of ours, there is no better means by which management can exercise control and guidance than through carefully prepared budgets and accounting reports of performance. These aids to management require the services of men who are more than bookkeepers. They require broad-gauged, technically trained accountants with a wide knowledge of the ramifications of the industry.

I often wonder if we had it to do over again whether we would organize our metering, billing, and collection methods as we do at present. Would our rate structures be the same—would we meter our customers' service as we do now? Would we generally charge residential customers on a kilowatt-hour basis when in the case of the small household user, readiness-to-serve is a far greater part of the cost than kilowatt-hours delivered? Of course, having grown with the industry year by year and having had a part in developing the present way of doing things, it is a trifle hard for us to see how our present system of metering and billing can be greatly changed. We now operate in accordance with standards and traditions that have developed with the industry. It is not easy to upset such established procedures, especially when they represent the results of years of intelligent effort and practical experience. Nor can we neglect the important fact that the public we serve has been educated to these same procedures both by reason of methods used by us and because of rules established and pronouncements made by regulatory authorities.

While the electric industry offers many varied opportunities to graduates of our technical schools and colleges, the fact must not be lost sight of that our work demands and offers wide opportunities to men of varied abilities with and without college education. A recent analysis of the distribution of employees in a typical large urban system shows that technical engineers after all represent but a small proportion of the total working force in the industry. As a matter of fact, electric utility employees represent almost a complete occupational cross-section of industry and business at large. In addition to the army of men who operate generation, transmission and distribution plant, there are technical and construction engineers, salesmen, lawyers and accountants. Also our industry makes large use of typists, stenographers, bookkeepers, and clerks of all kinds. In our mechanical forces we have carpenters, pipe fitters, welders, as well as men in such strictly electrical occupations as linemen, mechanics, metermen, switchboard operators, and so on. Our sales forces include floor clerks as well as outside salesmen; salesmen highly skilled in handling the technical manufacturing and process problems of industry and those with an expert knowledge of household appliances; men who know the lighting requirements of private residences, and commercial and industrial plants. Personnel workers, specialized in promoting employee training, and welfare activities all find a place in the industry. Then, too, in some of the larger companies we find still another type of employee—those comprising the customer service or customer relations department; employees who are well grounded in all company policies and practices and who are further especially trained to deal, in an understanding and diplomatic manner, with all customers who make inquiry of whatever character of the company through correspondence, telephone or personal visit.

Because of the nature of the public utility business, the majority of the workers therein are men. But women have entered in increasing numbers within the last fifteen years, and there are many desirable places for them. With the advent of the range business, there has come the need for college trained home economists, food and equipment experts, kitchen planners. The expansion of residential lighting business also offers an almost exclusive field for the woman worker. Because of the particular attention paid to increasing the use of electricity in the home, there is a constantly widening field for women in the sales, advertising and promotional end of the business. Accounting Departments of utilities offer many opportunities for women, and of course there is always the call for women stenographers, typists and clerks. So for the woman college graduate and the rank-and-file worker there are splendid and increasing opportunities in the utility field.

We must make quite sure that the younger generation discards the erroneous belief that the electrical industry promises a future only to the technically trained man. An engineering training is but one of the several important routes into the wide diversity of positions open to the young man coming into our industry. Of course, a man's choice of the specialized training suited to his needs and ambitions should be closely related to his aptitude, whether in engineering, sales, accounting or law. The young man should also recognize that in an industry such as ours, after a few years he may find himself in totally different work than might be indicated by his specialized training. Transfers between departments are frequently made in a large organization, not only for the purpose of broadening the training of men, but because of immediate needs. Consequently, an engineer often finds that he has developed into a sales engineer, or has moved into the Rate Department, or has developed into an expert on customer relations or accounting matters. It is needless to add to these illustrations to establish my point that the types of careers open to men in our industry are almost unlimited. It sometimes happens that the type of training is of secondary importance. It is most important, however, that there be some kind of training to develop a man's capacity for analysis, and equip him with mental tools and sources of information if he is to make the most effective start in life.

After all, the best opportunities for each young man lie in those fields for which he is best adapted by nature and by training. The problem for each man is to discover the field in which he is most interested and where he can best capitalize his capacity, effort, and ambition. To this end, he should make use of all the agencies in his community that are available to help him plan a career. I know that our school systems employ vocational guidance councils to help young people in this way, and in our universities there are vocational guidance departments which are prepared to interview young people and to give them advice that will best meet their needs. Many companies of the electrical industry are trying to help young people find their best opportunities by a careful analysis at the time of employment and by assigning each to the job he can do best and in which he can make the best progress, even going so far, in some instances, as to use psychological tests and other advanced techniques for this purpose.

In recent years we have witnessed a growing recognition of the importance of men with the ability to deal with people.

(*Continued on page 272*)

The Cost of Servicing Appliances

By R. E. Fisher

Vice-President in Charge of Public Relations and Sales, Pacific Gas and Electric Company, San Francisco, California

An Address before the Third General Session of the Fifth Annual Convention of the Edison Electric Institute, Chicago, Ill., June 2, 1937

IN the last few years we have seen remarkable strides forward in the merchandising of electrical appliances. According to recent figures published in Electrical Merchandising the retail value of appliances sold in the year 1936 amounted to $1,435,000,000. This represents an increase of 33 per cent over sales made during the year 1935. Substantial increases in sales volume were made in all types of domestic electric appliances.

The saturation of all domestic appliances is increasing very rapidly. Sales of electric refrigerators with a present saturation of 41 per cent were approximately 30 per cent above 1935—some 2,000,000 units being placed on the lines of electric utilities during 1936. Electric range sales during 1936 amounted to 178,000 units, which was 50 per cent above 1935. Electric water heaters sold totaled 104,000 units, also 50 per cent ahead of sales made in 1935.

I have specially mentioned these three appliances, the refrigerator, the range, and the water heater, because they bear a relation to the subject which I propose to discuss.

As these saturations of electric appliances increase there is developing a major problem of servicing, and a rather heavy burden is being placed on the electric utilities to a point where servicing costs to the utilities are getting somewhat out of proportion to the comparative value of the business. This is especially so in the case of the electric range.

Most utilities, I believe, have accepted a certain amount of this servicing work as their responsibility in the pioneering of electric load building appliances. In the case of the electric refrigerator many utilities purposely stayed away from direct merchandising because of their complicated mechanisms requiring more or less expert attention. It was not long, however, before the manufacturers and distributors provided satisfactory servicing set-ups themselves through their marketing organizations. This sales servicing was in a very large way, I believe, responsible for the early acceptance on the part of the public of the electric refrigerators. These servicing units which were established by the refrigerator people had much to do with the prompt correction of weaknesses that developed in the early models. Today we can almost place the electric refrigerator in the "fool-proof" class.

MR. FISHER

Now, progress along these lines with the electric range has been much slower, and for many obvious reasons as we all know. Competition with other fuels has been keen and the cost of electricity has been, in many cases, high. Today, however, we find that this *competition is much less serious,* and we have rates for electricity that compare well with most all other competing fuels. In addition, with the national eye placed on electricity, I think we have a great many of the women becoming more and more desirous of the *all-electric kitchen.* The electric range lends itself to the modern trend in home building. It only remains for us to take full advantage of these sales opportunities with the right kind of promotional effort.

It is not my intention to discuss sales, but servicing of appliances, to my mind, plays such an important part in the development of electric appliance sales that it should not be overlooked in any selling plan, especially in the case of the electric range.

I am advised that in some parts of the country, the utilities do no servicing whatever with electric ranges—all this work being left to the dealers. In other locations the utilities do all the servicing. In some locations the utilities do the servicing on annual servicing contracts, or make certain charges for materials and labor. There doesn't seem to be any standard way for handling the servicing of electric ranges. In the case of refrigerators servicing has kept well up with sales and provisions have been generally set up so that the retail outlets take care of all trouble either themselves or through some agent of theirs with the least inconvenience to the customer and at reasonable cost.

There is a tremendous market for electric ranges, the present saturation being less than 8 per cent, so it appears quite important that all the elements entering into the promotion of this load should be very definitely coordinated.

Most of the manufacturers give a one year guarantee on electric ranges and electric water heaters and a one year guarantee on subsequent parts purchased by the customer. While this guarantee seems to be quite sufficient to most of us, it nevertheless requires the utility, at least in our case, to set up more or less complicated records to determine how long a range or a particular part has been installed, in order to know whether or not the customer is entitled to free replacement. Dealer sales are especially difficult to follow from this angle. It practically means that a record be kept of each part on the range.

In our company we formerly kept a card record of each range installed on our lines with a complete record of all repairs noted thereon, which was posted from the range repairman's tags. This proved quite burdensome, so we have

since adopted a system of attaching a small brass tag on all ranges installed on our lines, and similarly on all new range parts subsequently installed. These brass tags show the date installed so that our range repairmen may be in a position to tell the customer without delay whether or not they are to pay for the part replaced. In case the part to be replaced has broken down during the period of guarantee, our men simply state that there will be no charge, and if the repairman has the right kind of element or part in his wagon stock (which he seldom has, on account of the great variety of appliances) he completes the job then and there to the entire satisfaction of the customer. It only remains for him to file a claim for a new part, which in itself is no small procedure, involving much paper work and the return of the defective part as proof of it having broken down, for the benefit of the distributor or manufacturer. The tag can also be adapted to other useful purposes such as marking correct lead wires and identifying parts removed for claims.

The cost of records and paper work is quite an item of expense. I venture to say that very few of us know exactly just what it amounts to. The more direct item, however, that has most to do with running the cost of servicing up is the labor involved *in the field*. A thorough analysis of this work made in our company showed that of a total cost of $117,000 for this work in 1936, 67 per cent of the cost was for labor; transportation expense amounted to 18 per cent, and material and supplies accounted for 15 per cent of the cost.

In addition to the $117,000 spent in 1936 for servicing electric appliances, we spent some $192,000 in handling other ordinary servicing work, such as blown fuses caused by faulty electrical cords, overloads, etc.

Now, as I said before, the electric refrigeration industry has done an outstanding job in establishing a servicing set-up through their marketing organizations, and no one, I believe, could possibly criticize it. It is especially important and necessary that they have this very satisfactory servicing set-up because of the long period of guarantee on electric refrigerators and because of the keen competition. The prospective buyer is very much interested in the proper operation of the refrigerator and he has plenty of friends to turn to to learn what their experience has been.

Generally speaking, I think we can agree that the servicing of electrical appliances is primarily a responsibility of the manufacturer, especially since the guarantees originate with them. The dealer represents the manufacturer in performing the actual sale to the customer. In addition to his sales ability he should be selected because of his continued interest in the appliances after they are installed and operating. There is no doubt but what the manufacturer sets up a reasonable amount in the price of the appliance to take care of repairs and replacements during the guarantee period. Customers have learned to place a great deal of reliance upon the electric utility that is built upon service and naturally look to them in time of trouble. Therefore, when appliances break down, the customer, not knowing what the fault is, usually calls the electric utility, whom it seems must act as the coordinator of all concerned. The utility is anxious to get the load back on the line; the manufacturers and distributors are, of course, anxious that their appliances give good service, and want faulty parts promptly replaced and the appliance put in good working order. The dealer who has sold the appliance should be very much concerned with the proper and continuous performance of the appliance because many of his sales originate from a satisfied purchaser.

Therefore, it seems to us that all concerned should bear an equitable part of the cost of servicing. How this can be accomplished is another matter. There are probably a number of ways that this could be accomplished, but inasmuch as the saturation of electric appliances is rapidly increasing all over the country, it is very desirable that some plan be worked out so that a more equitable allocation of costs can be brought about. Our present policy is to furnish all simple repairs on electric ranges and water heaters without charge to the customer for either labor or materials. During the period of guarantee we make all replacement of parts free of cost to the customer, subsequently obtaining the necessary part from the manufacturer by claim. After the period of guarantee we make a charge for all parts replaced at the regular retail prices—labor again being furnished free—and as I have previously mentioned, it is *this labor item* that is mounting each year.

From the customer's viewpoint, let me say right here that it is not our intention of curtailing this service on electric appliances in the least. Rather we think that there might even be a further extension of it. The problem as we see it is just *how* this servicing can be continued and perhaps improved but at the same time relieve the utilities of these rapidly increasing costs for servicing.

No progressive utility seeks to minimize its opportunity of contact. It has value but good business dictates that it should be done at the lowest possible cost.

In one of our divisions representing less than 5 per cent of our customers, we are trying out a new policy, which if successful may be extended throughout our entire territory. The new plan has for its purpose the reduction of appliance maintenance costs. A study of range service calls showed that approximately 50 per cent of the calls involved open coils in range elements, so in the territory where we are conducting this new experiment we are offering to replace these open coils by selling closed units to our customers, giving them a $1.50 trade-in allowance per unit, hoping to replace as many of these open coils as possible. We are also paying a commission to range repairmen to induce them to sell the customer closed elements, and salesmen are paid a higher commission for ranges sold with closed elements.

In this same division on all new ranges sold by the utility, we are telling the purchaser that we will maintain the range in good operating condition for one year from the date of sale; thereafter any parts that may be subsequently installed will not carry a guarantee, and a labor charge of $1.00 per hour will be made for time on the premises. We have notified dealers that we expect them to maintain the appliances that they sell during the first year of operation, or during the period of guarantee, replacing parts, etc., in accordance with the manufacturers guarantee. If the dealer can not give sufficiently prompt service the utility will make the repairs for the dealer on a time and material basis. The same arrangement will continue after the guarantee period.

We realize that the electric range user must be considered first in any possible change of policy with regard to servicing appliances. When electric appliances were first introduced, special inducements were required in order to consummate the sale. These inducements included promises of free servicing and liberal guarantees. This necessitated that the utilities provide adequate servicing organizations to back up the

promises made by the salesmen and to hold the business that had come on our lines. We realized that if the revenue from the electric range business was to be maintained we just had to take care of the appliance breakdowns. If we didn't do this servicing it was evident that no one else would. The result is that the customer still is looking to the utility to take care of his electric range troubles. Nothing has happened in the last several years to alter the situation except that the electric range manufacturers are turning out electric ranges very definitely improved in detail of construction. This has to a certain extent reduced the amount of maintenance work required per range. However, the electric range is still a long way from what we might call the fool-proof stage. The reason for this is that some manufacturers are still turning out ranges on a price basis, which means cheapening in the design and construction of switches, elements, and thermostatic controls. This is usually done with little or no regard to the subsequent cost of servicing the appliances.

In order to get the old electric ranges and water heaters off our lines that are expensive to maintain, we pay our salesmen a commission for selling a new electric range to replace them. This practice has been followed for several years and an increasing number of old ranges have been replaced with new ranges.

The new electric ranges now being placed on the market by other manufacturers are going to give us much less trouble I am sure, due to better design and construction, especially the heating elements. This will greatly assist in reducing the cost of maintenance. The new electric water heaters likewise are going to give us much less trouble. There is one new servicing problem that some of these new electric ranges have brought about which I might mention. In the design of these newer ranges, provision has been made for placing the switch panel, timing instrument, thermostat, etc., on the back splasher. This works out all right where the range has sufficient clearance in the back so that the repairman may get at certain trouble, but with the new built-in kitchens which are becoming more and more popular, repair work develops into quite a task because the range is placed almost directly against the back wall. There have been instances already that have occurred in our territory where it was necessary for our range repairman to go back and get another man to help move the range out from the wall in order to get at the trouble. With a nicely furnished kitchen it is very difficult to do this without marring the linoleum or causing some other minor damage much to the dissatisfaction of the lady of the house. Such jobs are going to be expensive to handle, but it is hoped that the manufacturer will design these new ranges so that trouble with switches, etc., can be repaired without pulling the range out from the wall.

It has been our experience that dealers, especially the small dealers, generally are not equipped to handle electric range servicing because of shortage of workmen, or delay in obtaining materials which are not carried in stock by them. Usually their records are not in proper shape to know whether or not the range has been in operation less than one year, and to further aggravate the situation, their charges for servicing are in many cases too high. Therefore, to turn this work over to dealers without careful analysis of the situation will only serve to retard the progress of electric range sales and other electric appliances. Dealers should, of course, have a personal interest in the sales made by them, which should include maintenance of the range in good operation during the period of guarantee. After the period of guarantee has expired, that same interest should be maintained by the dealer by the rendering of prompt and efficient service at a reasonable cost to the customer.

Most of the major manufacturers are turning out excellent electric merchandise these days, but there are plenty of cheaply constructed appliances that are going on our lines every day. Usually the firms that sell these cheap appliances have no service organization, and have absolutely no interest in the future operation of the equipment, and very often refer the customer to the utility. The unfortunate thing about this situation is that if the utility takes the stand of referring them to the dealer from whom they purchased the appliance, it leaves the customer out on a limb, so the utility, being anxious to keep the appliance on the line, becomes the goat.

The tie-in between manufacturers, distributors, and the utility, is not exactly what it should be with regard to appliance maintenance work. It is very difficult to arrange for changes in policy or for corrections in faulty equipment used in the construction of appliances. A more direct method of handling this part of the work is very desirable. With the thousands of electric appliances now going on the lines, faulty parts rapidly come to the surface, and if the manufacturer could be apprised of these matters promptly, and corrections made, it would be to the mutual interest of all concerned.

We have a problem with price lists of parts. With eighteen different standard makes of electric ranges, each firm with a dozen or so models having their own particular design and construction, you can imagine what it means to quote prices to customers for parts embracing anything from an oven door handle to a complete new cooking top. It is not so bad from an individual manufacturer's standpoint, but when the utility has to quote prices for parts used on ranges for eighteen different manufacturers, embracing hundreds of models dating back fifteen or twenty years you can get some idea of this problem.

As far as the customer is concerned, we recognize the fact that the utility is probably in the best position to coordinate all these matters dealing with the proper servicing of electrical appliances. Our territory is naturally covered by district offices with their respective troublemen covering the territory, which makes it easy for the customer to get in touch with us. Everyone knows how to get in touch promptly with the Power Company, and the Power Company through its organization can promptly get to the customer. It is the natural and most logical way to handle the problem, especially during the pioneering period, but due to the increasing cost of this appliance servicing, coupled with continuous and regular rate reductions some relief has to be obtained. The mere fact that the utility has the facilities for giving prompt and efficient service should not be any reason for them bearing the cost of servicing appliances beyond a reasonable figure.

As a utility, we can not afford to overlook the customer in any program designed to reduce the cost to us of appliance servicing. No matter what system may be set up within the industry, the utility is going to play a very important part in it. The inherent nature of our business will always tend to inculcate the thought in the minds of our customers that when anything goes wrong with an electric appliance "Call the Power Company."

It has been a common practice in many territories to use as a major sales argument, the continued and assured

servicing by the utility. This practice has a tendency to detract from the real merits of electric cooking.

I understand that some of the major manufacturers have already sensed this servicing problem and are establishing appliance servicing stations throughout the country under the general jurisdiction of Service Supervisors who will become more or less acquainted with the situation that exists in the field. I think this is an excellent move on their part and it should serve to bring about a closer relationship between manufacturers, distributors, dealers, and the utilities on this very important matter.

The establishment of field servicing organizations by the individual manufacturing companies may be rather an expensive undertaking when we consider the industry as a whole, because when you take into consideration that there are some thirty or more companies manufacturing electric refrigerators, over thirty-five firms manufacturing washing machines, twenty-five or more firms manufacturing ironing machines, and some eighteen or so firms manufacturing electric ranges and water heaters, it is easy to see that there is, or there is going to be, a tremendous duplication of servicing organizations. This duplication will be somewhat done away with because several of the major companies manufacture all of the major appliances and their respective servicing work will naturally be consolidated more or less.

This apparent duplication of organizations servicing electric appliances certainly will have the effect of holding prices up, which, of course, is not desired. It seems that the most economical arrangement would be for one organization to handle all electric appliance servicing, which arrangement would provide for sufficient manpower, low servicing costs, a minimum of stock in the warehouse, and a specialization not possible at present without excessive costs.

In conclusion, I would summarize the electric appliance servicing problem from the utilities' viewpoint as follows:

1. Let us recognize that the servicing of electric appliances as an industry problem involves definite responsibilities to the manufacturer, the seller of the appliances, and the electric utility.

2. It is timely that an organized effort be made to study and possibly re-define the responsibilities of service by the various groups of the industry. Within the past few years conditions have warranted a change in the utility's service policy on electric motors and in the domestic field we are, perhaps, in a transition status wherein certain domestic appliances are now generally serviced by dealers, and yet others, particularly electric ranges and water heaters, are still serviced primarily by the utility. Due to competitive conditions, the time may not as yet have arrived for the utility, in some localities, to modify its servicing policy.

3. Study should also be given to a redefinition of servicing. One phase of this should be considered as maintenance and repair work which should be logically the responsibility of the seller of appliances, whether dealer or utility. The other phase of servicing that could be clarified would be that work done by the utility strictly in the nature of servicing work, apart from maintenance and repair work.

4. The industry should recognize the trend in appliance sales from the viewpoint of appraising the extent to which dealers in any locality are becoming an increasingly important factor in the sale of various types of electric appliances. The maintenance repair phase of servicing work now rendered by utilities should be proportionately less as good dealers become increasingly active in the sale of appliances. To bring about the desired results calls for united action on the part of both the manufacturer and the utility in developing the ability and efficiency of the dealer through educational classes and experience in the field. Prescribed courses covering all phases of appliance servicing should be carefully prepared.

5. It is urged that manufacturers give further consideration as to the intent of certain guarantees that they offer the public on various types of appliances. Since the customer has every reason to expect that these guarantees will be fulfilled either as they apply to the new appliance or to replacement parts, it is obvious that the guarantee policy on the part of the manufacturer should be correlated with the utility's and dealer's servicing policies. Particular attention should be directed to changing the parts guarantee, involving as it does considerable cost to maintain necessary records, replace parts and secure credit.

6. Office and field organization for receiving and executing service calls can well be studied. I am of the opinion that through education and centralization satisfactory results will repay efforts expended.

7. The coordination through one source of manufacturers' agents, sales and service representatives with the various utilities' public relations, sales operating, claims, purchasing, stores, and accounting departments on all matters of operation, construction, service, and procedure, would be of distinct benefit.

8. I have purposely refrained from quoting statistics that involve cost per appliance, cost per call, and total expense in relation to revenue. This is a subject that will naturally receive attention in due course, and not until standard procedures are adopted will the relation between various companies mean anything.

9. Last, but not least, the electric industry should recognize that the public must be served. The privately-owned electric utility has, in the past, earned a reputation for good service, and with the cooperation of the manufacturer, distributor, and dealer, should maintain a service to its customer superior to that rendered by any publicly-owned utility.

Whatever change is made in restricting of service must be so gradual and so completely worked out in every detail that our customers will not become alarmed or discommoded.

I understand that there is a committee in the Edison Electric Institute studying policies, procedures, etc., in connection with the servicing of electric appliances. I hope that their work will be the basis for aggressively prosecuting a program in the general direction outlined in this paper, with the ultimate objective of reducing costs of electric appliance servicing of the utility and to the customer.

Opportunities for Youth

(*Continued from page* 268)

Engineers as well as others in supervisory positions must have a knowledge of human nature, understanding of and sympathy for people, a sense of justice and fair play, and a loyalty to the men working with them. They must possess a social consciousness and have a willingness to assume a broader part in the scheme of human life and human effort. Such an outlook is especially necessary in the electric utility industry which, by its very nature, is built not merely to create new techniques but to serve large masses of people who are dependent upon it for their welfare and comfort.

What personal returns may a young man entering the industry now expect to reap? This question should be answered frankly. Speaking generally, I think it can be said that the electric utility pays to the average employee slightly more than other industries and provides, in addition, a continuity of employment seldom experienced in other fields of business. The industry, however, does not hold forth promise of exceptionally high earnings to its most successful employees as many other large businesses do. This fact is expressed in a study made by two members of the staff of Columbia University covering salaries paid in past years to the chief officers of over 400 large corporations. Figures covered by these impartial observations lead them to conclude that "public utility salaries for major executives are very low,"* top salaries and secondary salaries being only about three-fifths of those of the general run of companies of equal magnitude as measured by the total assets, gross revenues, and number of employees of the respective corporations. Such facts suggest that young men entering the electric industry must

(*Continued on page* 312)

* E. L. Thorndike, B. P. Beckwith, "Salaries of Executives." Personnel Journal, March, 1937, page 312 ff.

Education and Light

By Dr. Morris Fishbein

Editor, The Journal of the American Medical Association

An Address before the First General Session of the Fifth Annual Convention of the Edison Electric Institute, Chicago, Illinois, June 1, 1937.

IN one of the most popular books of all time, probably the best seller, a book called the Bible, there is a statement, "Let there be light." That statement has come down to man over a long period. It might well be a motto for any organization interested in the dissemination of light, as both yours and ours must be.

We have always recognized the great importance of light in relationship to health and life and in relationship to the practice of medicine. Florence Nightingale, who was the founder of the profession of nursing, was known as the "lady with the lamp." As she traveled the hospital wards she carried a lamp, and the light she carried brought renewed desire for life to the sick whom she served.

Before the coming of the incandescent electric lamp, there was really no light for mankind worthy of the name. But with the coming of electricity into life, we really began to live. We have seen tremendous changes and advances taking place in our civilization based on just that one factor. In the days before the coming of the incandescent lamp and electric light, when a doctor wanted to look in the throat of a patient, he got the patient in a chair, or somebody held an oil lamp over the doctor's shoulder, and he looked down to see as far as he could see. A little later, electricity came in, and it became possible to transmit light into every opening of the human body; in fact, we now have an electric lamp or scope for every entrance and exit of the human body, and where there isn't one, the doctor can make one. This means much for his happiness and that of his patient. Not long ago they had a man on the table in the Presbyterian Hospital here in Chicago; he was being examined by cystoscopy, the introduction of a long instrument with a light on the end into the body. It is usually rather painful. But this fellow seemed to be enjoying himself and finally the doctor said, "What is so funny?"

The man said, "I have been tapped for water and piped for gas, but this is the first time I was ever wired for electricity."

DR. FISHBEIN

There are many uses of light in the field of medicine: the ultraviolet light and the infra-red light and the use of x-ray and many others about which much has been said. I am concerned not so much with these unusual types of the application of electric currents to diagnosis and treatment of disease, as primarily with the relationship of light to vision. In this relationship we are naturally concerned with certain factors with which the majority of the public are not familiar. The failure of the public to appreciate the common terms which most of us use in these discussions is, I believe, a fundamental failure on the part of your particular profession. Nowadays, if you ask the average man on the street what the normal temperature of the human body is, he can usually tell you 98.6°. He has seen that on a thermometer and he knows temperature is measured in degrees Fahrenheit on the thermometer.

If you ask him, he has a fair idea of how to count pulse, because he possesses a watch. Before we were able to count pulse, we had to have some method of measurement. It is interesting to know that we had no measurement to count the pulse until Galileo studied the way in which a pendulum swung. Out of that we developed a clock and out of that we get our modern watch with a second hand. We learn to count the pulse beat in terms of time, so many pulse beats per minute.

We count other factors by systems of measurement. We measure blood pressure. Most of the intelligent men in this group could say right off what their blood pressure happens to be at the present time; they know it is measured in millimeters of mercury. We measure overweight and the amount of food we take in—overweight in pounds, and the amount of food we take in in calories. There is hardly an intelligent woman in the audience today that doesn't know approximately how many calories she is taking in. She knows if she is taking in more than 2000 calories a day she is getting big in all the places she would rather be little.

Until you know how to measure any particular material or function of life, you cannot have general public education regarding it.

Some of our various ways of measuring things are rather comic. We measure diamonds in carats of weight. That doesn't mean much to the average man. We measure distance on land in rods, and in knots at sea, and that doesn't mean much to the average man. We measure drugs in scruples and drams, and those, again, are measurements which do not mean very much to the average man. We still continue to measure light in terms of foot candles. The average human being hasn't the slightest idea of what a foot candle is and I don't believe he cares much about it. Unless he knows what a foot candle means in terms of measurement, he is not going to care much about it. Unless he knows how much distance a knot is, he is not going to care much about the fact that the ship is going nineteen knots or twenty knots per hour. He is much more interested in the things he can immediately visualize. Thus we begin with a difficulty at once in the fact that an average man does not know how much a foot candle really is.

A foot candle is the amount of light

thrown on a surface by a candle one inch in diameter one foot away from that surface. When I tried to visualize a foot candle in those terms, I had no idea of how much light a candle one inch in diameter would throw on a surface. The definition is nebulous and vague. To help us you have developed the photometer. With this any one is able to measure foot candles. As soon as you take the photometer into a business office or home, you see at once that people really are interested in light.

People want to know how much light they are getting and whether or not that light is the amount of light they ought to have. We have found in our educational work in the field of health that health is most interesting to human beings. The moment you get them talking about their illnesses and their complaints, you see them perk up. If they happen to be very young, they are interested in their ability to accomplish various things with their bodies. We have the records for human performance of various kinds. As soon as you begin to talk about the eye and the ability of the eye to see and get people to bragging about how well they see and how badly they see, you will find that the eye is among the most interesting of the organs of the human body at every age.

Outdoors in the sunlight a man finds he gets 10,000 foot candles. If a cloud creeps across the sun, he gets 5000 foot candles. In the shade he may get as low as 1000 foot candles outdoors.

I do a great deal of traveling; one time I measured the amount of light that I had in a Pullman car by which to read. I discovered that in an average Pullman berth you get something under two foot candles of light. That is a reflection on the Pullman Company, and a reflection on me for not trying to find it out sooner. Anyone who tries to read a great deal knows now why he gets tired when he wants to read in a Pullman car.

There are important things about vision for us all to know. One is that the human body is built with factors of safety. That is fortunate for us. Without these factors of safety, many of us would have been dead long ago because of the way we have used portions of the body which are susceptible to abuse.

Surgeons have found that there are factors of safety in the body, because they can remove great portions of it and still have the person exist. They found they could remove one kidney and that a person could get along with the other one. Then we began removing first a third, then a half and finally an entire stomach, and we found people could live under such circumstances. They removed the spleen, and quite recently they removed an entire lung. Now that has been done many times. About four years ago a doctor removed one-half of the cerebrum of a woman and found she could think thereafter as well as any ordinary woman.

These factors of safety are matters of the greatest importance to the human race. When we study the human eye, which is one of the most fundamental organs of the human body, we find the factors of safety are tremendous. Were they not so tremendous, many of us would begin to suffer much more quickly with fatigue of eyesight than we do. For example, we are fortunate in having two eyes, because frequently people lose one eye, or they begin having trouble with vision. There are various diseases of the eye which cut down eyesight tremendously.

No one yet has actually measured how much abuse an eye can really stand from the point of view of fatigue. If you set a man in a chair and concentrate a bright light on his eye, and keep him awake and keep his eyes open by force, you soon find that you are subjecting his eyes to a strain that a human eye was never calculated to bear. There are few men who can resist that type of abuse in what the eye is able to accomplish.

But no one has made the experiment of putting a person in one-half efficient light and having that person read to the best of his ability as long as he possibly can, doing that for hours and hours, until a measurement was obtained of how much an eye can do when it is working in half light, as compared with an eye working in the best possible light.

We know there are various factors in relationship to deficiencies of light as they concern the human eye that might be compared to deficiencies in food as compared to vitamins. If a human being has a diet deficient in Vitamin A, on which his eye depends to a certain extent, he develops a condition known as xerophthalmia, which leads to blindness. The condition exists in Newfoundland, where people are submitted to glare, and where they get a diet of white flour and salt pork, a diet highly deficient in Vitamin A.

In Holland, during the war, there were scores of children in orphan asylums with xerophthalmia, because the thrifty people sold their fresh butter to the Germans and used oleo, without Vitamin A.

The lack of light for a normal eye, might bring fatigue or destruction of the eye. The theory is easy to believe, but unfortunately, no one has ever done a scientifically controlled experiment to prove how much of a deficiency of light is necessary to bring about a disease of the eye, and how long a sustained experiment could be conducted.

As I look into the story of education and light, I find a great necessity for more research by illuminating engineers and by physicians, to develop necessary knowledge which we need to carry to the people.

We have found, also through scientific medical studies, that the size of the object, in addition to the amount of illumination cast on it, the amount of contrast that is available, i.e., black and white, and the direction of the light thrown upon the object are all matters of importance. Any of you who have taken part in this Better Light-Better Sight campaign, carried on under the auspices of your industry, know these things. You know how important it is that there be suitable contrast in relationship to light. The young man who demonstrates in the hall shows how much better you can see a black thread on a white background than you can see it on a black background. When you get a sufficient amount of light, you can see a black thread on a black background almost as well as you can see it on a white background. He didn't know that if you were highly deficient in the amount of Vitamin A in your diet, you couldn't see the black thread on either the black or white background.

I mention this merely to show the necessity of having all the knowledge before you go out for demonstration. This importance of contrast between black and white in vision was illustrated by the definition someone gave of the difference between the philosopher and the psychologist. A psychologist is a blind man in a pitch-dark basement, looking for a black cat. A philosopher is a blind man in a pitch-dark basement looking for a black cat that isn't there.

The doctors of this country in the American Medical Association, which contains about 106,000 of the 140,000 practicing doctors in the country, have been interested in the effects of light for a great many years. Twenty-five years ago our first committee was ap-

pointed to look into the effect of light on vision. The first thing they did, as committees do, was to go back to the record to find out how much actual research had been done. They found that so little research had been done that it was impossible to say anything about it, except that you should have good light when you are trying to see something, but nobody knew what good light was, and nobody knew the limitations of vision.

Twenty-five years have passed since then, and still there is little to add to what we know about light and vision. Our habits have changed greatly in the past twenty-five years. Our hours of work have changed. That, unquestionably, will make a tremendous difference to the lighting industry. In the old days, from 1890 to 1900, workmen used to get up in the dark and arrive at work in the dark, because they had to put in twelve or fourteen hours a day. They needed artificial illumination at both ends of the day. Now the workday has been shortened, and some Congressmen are talking confidently, I believe, about the six-hour day and the five-day week. What a difference that is going to make to the light industry! Working with modern machines and with the speed at which we work nowadays, the right kind of light is much more important than it used to be when work was carried on in a leisurely manner by men who were artists in their particular craft.

Back in 1900, nobody talked much about contract bridge. In 1922, Americans used 10,000,000 decks of cards annually; in 1936, we used 96,000,000 decks of cards annually, most of them in a game which the majority of people understand poorly and pay for accordingly. The coming of contract bridge as the major indoor sport of America introduced a tremendous demand for new types of lights for bridge tables. Anybody who rates much in the bridge-playing industry realizes that the right kind of light at the bridge table is a very important matter in relationship to the cost of that particular amusement.

Back in 1890 and 1900 the books we read were in fine type with a small amount of white space between the lines. Reading was done under a considerable amount of difficulty. Before 1900, most Americans lived in homes with large windows, far removed from the next-door neighbor and with plenty of light. Nowadays, the kitchenette apartment is the prime type of habitat in the vast majority of our large cities. In New York City in 1920, the average family had five rooms; after 1920, the average family had four rooms, and in 1937, there are less than three rooms to a family in New York City. That means much more use of artificial lighting and much more attempt to do work away from outdoor light. It is easy to get indigestion in the stomach from the wrong kind of food, it is easy to get fatigue in the eye from the wrong kind of reading matter consumed by the eye, and the wrong light thrown on the reading matter you are trying to digest.

The psychologists have given much attention to this subject. They found that a fast reader retains more of what he reads by thirty-seven per cent than one who reads slowly. Your ability to read and retain depends on the type of mind you have. Expert readers like the former President Roosevelt and the present President, encompass an entire page at a glance. You are familiar with the working type of reader who pronounces each word as he reads, with most of his intelligence being transferred into motion.

We know the average intelligent person reads from three to five words a second, 180 to 300 words a minute. The 20-point type he can read much faster than the 6-point type, with the words close together and no white space between the lines. Give him a 6-point type book, with no space between the lines, and give him poor light in which to read and you delay considerably the amount of information he can get from what he reads and the amount he will retain of the information that he gets.

I think the insurance companies count on that, by the amount of small type they put in an insurance policy. I have always warned people, "When you buy a policy, don't bother about the stuff in big type. They know you will get that. The thing to read is in small type." For that, you naturally need a very good light.

If you are in an outside room with large windows coming down almost to the floor you can do without artificial light, in the majority of the day. We have also found the farther you get from the window, the less is the intensity of your vision.

Insufficient light is responsible for lessening of vision, discomfort and inefficiency. As the eye becomes fatigued, more and more accidents begin to occur. That has been measured by industrial commissions in Great Britain, Germany, France, and in the United States. Here again, the medical profession is especially interested, because we need to prevent accidents. True bodily fatigue produces accidents, but visual fatigue produces more accidents than any other factor in the human body. The longer the eye works without enough light, the greater the amount of eye fatigue and the greater amount of accidents.

There are certain types of work in which light is more necessary than in others. The man working with a microscope throws light on the object he wants to see. The man in the jewelry trade, or the manufacturer of razor blades, must again have special lighting for his work.

We are not so much concerned with the man who needs special lighting for his work as we are with the average man. The United States Public Health Service made an investigation in the post offices of the United States, and they found out that mail clerks working in ordinary light found their work immensely improved by changing from 3 foot candle illumination to 11 foot candle illumination. The average man cannot visualize what you mean by a change from 3 foot candles to 11 foot candles. You have to show him.

A lesser number of errors occurred in sorting of mail as soon as they moved from 3 foot candles to 11 foot candles. If they wanted to speed up and to make their work more efficient, the first step is to provide a satisfactory amount of light for the man working. Next determine the efficiency of the instrument which uses the light; namely, the eye itself. Thirty-five per cent of the men working in the Chicago Post Office had vision not properly adjusted by competent oculists so the man would not have the glasses for the kind of work he was doing and for the kind of eyes with which he started.

The eyes of school children are a special problem. It is a problem of seating, the arrangement of the room, comparison of the eye of the child with the eye of the adult, the posture of the child, the kind of light he gets on the desk while studying. No doubt a large factor of preventive medicine in the future will be to provide the child not only with a suitable desk, but a better amount of light. Then we will have a lesser number of round-shouldered, thin-chested children, with a better life and longer life expectancy.

In the Wilmer Institute of the Johns

Hopkins University they have studied eyesight in the aged. Eyesight in the aged is coming to be an increasing problem. More people are living longer than they used to. We didn't worry about the aged in 1900, because then the average life expectancy was 40 years, but today the average life expectancy is 59 years, and so many older people are living and are competent to carry on their work that the problem of the health of the aged is an important problem confronting the country, reflected in the necessity for old age insurance, old age pensions and all the other things that have come into our lives in the last forty years.

The eyesight of the aged is the most important factor in keeping a man past sixty years of age economically independent and able to carry on his work. Competent scientific research shows the eye of an older person requires more light than the eye of a younger person. A person of 63 years of age can see with 60 foot candles what a younger man can see with 5 foot candles. A man who is far-sighted at seventy years of age, can see with 100 foot candles approximately what a young man can see with 1 foot candles. The aged need more light because the pupils of the eye become smaller with age, the tissues of the eyes become less translucent, and they cannot develop images within the eye as well as they can when the person is younger. It is safe to say, if you want to draw an aphorism from this, you can tell the average man that for all people over sixty years of age, anything less than 100 foot candles means inability and inefficiency to work with the kind of eyes they have.

We have taken the first step when we see there is something we can talk to people about as far as it concerns their vision. The next question is how your industry is going to disseminate to the vast majority of the people the amount of knowledge already available and how you are going to get the additional knowledge you ought to be disseminating to improve people's health.

There is necessity for a campaign for more and better research on the relation of vision to eyesight. That research should not be done primarily by the industry interested in selling electric power or selling Better Light-Better Sight lamps. Research should be done primarily in unprejudiced hands, in universities, in institutes of research. Then when the result of the research is set forth no claims will be made that the re-

(*Continued on page* 294)

SALES—ELECTRIC REFRIGERATORS

(*Household Models Only*)

MONTH OF MAY AND FIRST FIVE MONTHS OF 1937-1936

	Month of May 1937	Month of May 1936	Month of April 1937	First Five Months 1937	First Five Months 1936
Total United States	333,061	329,140	335,214	1,437,980	1,204,188
Maine	1,433	1,570	1,168	5,332	5,150
New Hampshire	914	1,514	904	4,039	4,915
Vermont	1,004	984	893	3,975	3,016
Massachusetts	11,367	12,508	11,921	59,349	48,400
Rhode Island	1,206	1,626	1,650	7,950	6,674
Connecticut	5,368	5,789	4,615	26,999	20,315
Total New England	21,292	23,991	21,151	107,644	88,470
New York	35,901	34,326	36,277	150,138	126,608
New Jersey	10,613	11,667	14,114	55,107	52,622
Pennsylvania	31,707	33,660	35,663	137,766	109,867
Total Middle Atlantic	78,221	79,653	86,054	343,011	289,097
Ohio	25,753	25,832	24,666	105,337	77,111
Indiana	9,806	10,019	9,469	41,157	34,641
Illinois	29,487	31,215	26,376	115,577	91,931
Michigan	19,294	23,200	17,151	74,773	59,295
Wisconsin	5,279	7,088	5,710	30,429	22,419
Total East North Central	89,619	97,354	83,372	367,273	285,397
Minnesota	6,429	5,098	7,001	26,839	16,701
Iowa	4,393	5,409	5,003	23,776	19,720
Missouri	10,057	9,475	9,441	44,216	39,354
North Dakota	507	664	699	2,779	2,569
South Dakota	621	779	655	3,439	3,474
Nebraska	1,931	3,069	2,602	11,301	11,642
Kansas	4,099	3,415	4,341	18,199	15,276
Total West North Central	28,037	27,909	29,742	130,549	108,736
Delaware	907	651	524	2,904	2,308
Maryland	4,447	4,552	3,654	16,984	14,868
District of Columbia	2,450	2,682	3,093	10,241	10,213
Virginia	5,606	6,341	6,154	22,734	19,924
West Virginia	4,194	6,616	4,807	18,114	17,049
North Carolina	9,161	7,476	9,139	33,603	25,168
South Carolina	3,823	3,457	4,272	15,681	12,093
Georgia	6,101	6,644	6,735	26,756	20,460
Florida	2,763	2,508	2,474	14,860	12,307
Total South Atlantic	39,452	40,927	40,852	161,877	134,390
Kentucky	4,965	4,900	5,449	19,023	16,295
Tennessee	6,450	4,616	6,488	25,197	19,681
Alabama	4,047	2,945	3,735	16,156	14,246
Mississippi	2,172	1,498	2,568	8,350	6,889
Total East South Central	17,634	13,959	18,240	68,726	57,111
Arkansas	2,170	1,675	2,622	9,190	8,140
Louisiana	3,629	2,479	4,100	14,681	12,985
Oklahoma	2,984	2,478	4,172	15,232	14,392
Texas	14,032	9,112	14,640	58,746	48,766
Total West South Central	22,815	15,744	25,534	97,849	84,283
Montana	1,310	1,308	864	5,647	5,185
Idaho	996	1,190	1,263	5,716	6,035
Wyoming	475	392	428	2,114	1,626
Colorado	1,789	2,588	1,967	9,877	8,961
New Mexico	930	575	816	3,239	2,604
Arizona	1,055	385	1,314	5,232	4,640
Utah	1,444	1,746	1,353	7,363	7,560
Nevada	766	259	288	1,891	1,468
Total Mountain	8,765	8,443	8,293	41,079	38,079
Washington	3,347	3,695	2,903	19,390	19,103
Oregon	2,065	2,621	1,548	10,459	13,399
California	21,814	14,844	17,525	90,123	86,123
Total Pacific	27,226	21,160	21,976	119,972	118,625

Figures based on report by the National Electrical Manufacturers Association.

What Women Can Do to Increase the Use of Electric Service

By Nancy Finch
Director of Home Service, Utah Power and Light Company

An address before the First General Session of the Fifth Annual Convention of the Edison Electric Institute, Chicago, Ill., June 1, 1937

THE Utah Power and Light Company operates in parts of Utah, parts of Idaho, parts of Wyoming and a small part of Western Colorado. We cover 52,000 square miles, and that is mostly mountain country, and only 3 per cent of it is under cultivation. That will give you some idea of the widely scattered area that we cover.

We aren't a large company in comparison with some of the companies that you represent, because we have only 97,000 residential and farm customers, and that wouldn't mean a great deal to some of you, but of course to us it is very important. Because we are so widely scattered and our homes are so far apart, we have homes that are much more self-sufficient. Our homes are still the major center of our interests. We do not have the large public entertainments such as you find here and many other places. We don't have many theaters. We do have motion pictures, of course. We do not have many places for recreation except those which have been built in the small communities by our churches. We do have a large center in religious interests.

Of course you know, if you know anything about our territory, it is all settled by the church, so the major interest is in the church. Those churches have always fostered amusement, and every one of the ward houses has in connection with it an amusement hall.

I tell you this because in our territory, working with churches is an important part of our work. We have in our area, 59 per cent of our homes owned. That means the people are interested in their homes and are interested in improving homes, and that the population is stable. An outstandingly large percentage of our farms are wired, an outstandingly large percentage in the United States.

Because the homes are widely scattered, the women interested in electric equipment are interested in what it can do for them. They are interested in an electric range which actually does the cooking it is required to do, and it isn't unusual for a woman to make eight loaves of bread every other day. That is the kind of equipment they must have, because they must have great numbers of meals.

MISS FINCH

Until 1929, the greatest percentage of our earnings was not from homes at all. It came from mining and smelting and such trades as those. We had a little flour milling, some oil refining, some sheep and cattle raising, some sugar refining. We could not count much on industrial use. When the depression came and mines went to the bottom along with it it became necessary for us to increase the usage in the residential and farm customers.

Picture the change in our organization. We did have some home service women, eight of them, and gradually that number increased. Those of us who know about home service know in some places it was pretty hard because there was no way to measure the value of the things we did. If you asked, "What is the value of home service?" most of the men in the organization would say, "They did a good job of education, but there isn't any way to see they are a necessary part of the organization." That is what we have to do, to prove that we are.

When we changed to our greater interest in residential customers, women had a fine opportunity in our organization to come in and prove themselves a part of the selling organization. In the first place, they are better prepared to sell in homes than men are, because we are selling to women in homes, and who should understand a woman's problem better than a woman in industry, if she has both sides of the picture. She knows what it takes for home making, she knows what it takes for selling, and of course, she can meet the housewife on her own ground. Men get into conferences where they still hear they must sell the use of electric equipment. Still, when they get out on a sale, they cease to sell use. They sell "Screws and bolts" as we say.

You can't get women to tell that kind of story, and women in the homes are not interested in that kind of story. I think that is one reason girls had an oppor-

"We have a standard term in our company which we call "selling the company" as far as our customers are concerned. We must sell them because we must establish good will. This is important to us because our people are so far apart. We can't let them get so far away from the company that they do not realize we are individuals and not just an institution."

tunity in our organization. They are selling use. Until 1935, they were mostly educators. We followed range sales. We were really glorified trouble shooters. Then the Better Light-Better Sight campaign came along, which gave us an opportunity to educate still further. We tried to measure the girls' activity and still in 1935 we had a hard time proving we did anything by it at all. We made many changes, although it is still the same as far as the service is concerned.

We increased the department from 11 to 48 in 1935, and we trained all of the first 11, who were all home economists. They continued to follow range sales and sell educational work on ranges, but the remainder were educated to sell. Naturally, in education, they were bound to sell some equipment, but that, I think, was quite accidental. In looking at the records, you see it must have been quite accidental, because when summer came and people lived outdoors, we didn't try to do much about it. We didn't try to sell equipment. I don't believe our story was very effective.

That is the reason we have become a selling organization. In fact, there are several reasons why we are a selling organization. In the first place, our type of territory is responsible for it. We must travel many miles to make home calls. It isn't unusual for us to have to travel 45 miles to one home. When you do that, you can't afford to send a lighting advisor, and then a woman to give education on a range and someone to sell something else. You can't afford to keep that woman on your list of calls for good service, to give her the feeling that the company is something besides a meterman who comes once a month to read the meter and collect the bill.

So our girls became saleswomen because they could do it all in one call. They could educate on the range, follow-up appliances, give education and do the things that were necessary to make a complete call. It cost too much for the sales, so the girls had to learn to close sales. It was a very important point to us.

Each girl has a car and they carry such things as bulbs, small lighting equipment, small pieces of equipment such as waffle irons, flatirons, and so on. It isn't unusual to carry roasters, and such things as pans for the use of electrical ovens. Some women have trouble using this type of equipment and are too far from marketing centers to get other equipment, so we take it to them.

Then we have become a selling organization because the girl who really sells merchandse sells use much better. She is much more intelligent, so far as her approach to a customer is concerned, she is much more interested. The girls themselves are much more stimulated because they have incentive, and more than that, the sale is the actual measurement of your ability to sell the story you have to tell. They do a good job of education, but they are more interested in it when they do a job of selling.

We sell, too, because we do not believe that a department should exist in a selling organization that does not sell. I tell you this because some of our western sister companies object very much to selling. Our own girls do. The girls in our home service departments always have, because it lowers their dignity. I cannot see but that selling an idea where you have a measurement of it isn't as dignified as selling an idea without a measurement for it.

We have made our girls' records as complete as possible. We believe that anything the company shows by way of improvement must be also measured by improvement we have helped to contribute.

Between 1935 and 1937, the average kilowatt hour use per customer has increased 21.5 per cent in our company. We are sure that girls contributed to that, because we averaged through 1936, 205 portable appliances per girl, and remember, there are 48 of us. That doesn't mean major equipment. Every girl in the organization has an average of $219 of estimated annual earnings per month per girl. Surely when girls are contributing that much to our earning ability and to our sales, they are making a valuable contribution to the increased kilowatt usage of our company.

We are doing as complete a job as possible, because we believe that is the best thing we can do to stimulate customer good will. We have a standard term in our company which we call "selling the company" as far as our customers are concerned. We must sell them because we must establish good will. This is important to us because our people are so far apart. We can't let them get so far away from the company that they do not realize we are individuals and not just an institution. We must sell equipment, we must sell the company. The girls must be educated on rates and that is important because in the last year we have installed two special rates and one special rate we call half-priced electricity.

We handle problems of equipment, high bills, and other problems in homes.

The best part of the work we do is to train our salesmen how to sell electric equipment, to get them away from selling parts and pieces. Also, it is our business to train all dealer salesmen in our territory, and last year we started schools for that, giving 50 schools for the salesmen last year alone, in selling electric equipment. Ideas have begun to increase enormously, and now we are so busy giving promotional schools for them we do not have time to give promotional schools for our own company.

Also, we sell for dealers. The girls stimulate equipment sales in homes, and if customers are interested in equipment from another dealer, it is our business to see it is purchased from another dealer.

We did another thing in our organization. A year ago in January we had 11 home economists and 36 advisors, and that wasn't a satisfactory arrangement. So we combined them. We train all the girls to do all kinds of work. They must all make range calls and help salesmen in selling of major equipment, and they must handle all problems that arise in the home in the way of selling and equipment.

So, we no longer have lighting advisors. We have been criticized for that, we have been questioned about it, but we do believe this program has been valuable to us.

When we combined our home service and home economics work so all of our girls could do all kinds of work, we started the training work in January. This will give you the number of calls made on an average per advisor. The average calls in February were 67; in June, when the girls were doing all the work and liked it much better, because June is the month they cannot sell lighting, they increased to an average of 121 calls; in other words, 81 per cent, because they had something to profit by now. The estimated annual revenue from their sales in February, per advisor, averaged $112. By June, they had stepped it up to $274, an increase of 144 per cent in average sales. The dollar value of the merchandise they sold in February was $5; in June $9.25, a 51 per cent increase.

This will be of interest to those of you who have to manage such departments. The cost per dollar of estimated annual revenue in February, was $1.01, including all expenses, salaries paid girls, commissions and bonus sales, and any incidental expenses incurred by demonstrations or advisors. In June we

dropped to 50 cents, an actual 50 per cent reduction in the cost of the operating department.

The number of prospects the girls report are interesting to us, because that is part of the job. They don't sell major equipment except to help the salesmen, but they are interested in turning in prospects for those things. The girls turn in on an average 5.8 calls for prospects per girl in February; but 23.4 per cent in June or a 303 per cent increase for the month of June.

That shows generally through the organization, and when you ask the girls if they prefer lighting to all-service work, I think without exception they will say they prefer the full-time job for several reasons. She handles her calls more intelligently because she can talk about everything. Previously, if the customer asked about lighting she had to say, "We will send out a lighting advisor." If the lighting advisor were asked a practical problem, she couldn't answer. It has increased our earnings because the girls are very much interested now. They like doing all kinds of work. It gives a better balanced year's job, because we can do major equipment selling, we can follow all the salesmen's campaigns, every girl can work on range campaigns. If it is small appliances we can handle those, and in the summer, when lighting would normally drop, we can do work on the small appliances such as toasters, percolators, irons, and so on.

There is a disadvantage that has been brought up. To train girls for all work is more costly. It is a little slower, but I don't believe in the end it is more costly because the girl produces so much better on the whole job than on just lighting or small appliances.

We have divided our work into three major functions. The first one we call pre-selling. This takes in the kind of work you are all familiar with, as far as home service is concerned. It means education, educating our customers in every way we possibly can. Last year we gave 1,046 group demonstrations to the public alone. That doesn't include work we have done for our own organization, for dealers or other people. We have given fifty dealer training schools, we have given our own employee schools —that doesn't mean just our salesmen, because we have all-employee campaigns and that means education of all employees.

I mentioned to you in the beginning our church organization in our territory and how necessary it is for us to work with the church. We know, for example, that Tuesday in our territory is absolutely lost as far as home calls are concerned, because Tuesday is the church day for the women. Unless we work with the church, we can't make calls on Tuesday. We have gotten in with the Relief Society, we give cooking demonstrations and all kinds of things to get in the churches. That, in turn, made it easier to get in their homes, because the women got acquainted with us.

We have no school in our school system that doesn't have at least one electric range, and some of them have all electric ranges. This year we have planned three high school kitchens, group unit kitchens, and they are all electric-range equipped.

Our social and civic work is important, and we work with organizations you have never heard of before, such as the mail carriers' wives, the plasterers, and so on, and their wives. As far as group organization is concerned, the major part of our work is pre-selling.

We have been working with a direct selling course for direct sales of small appliances. Now the girls can push those things in homes and that makes a fine outlet for small appliances. Naturally, people buy them because it doesn't take extra wiring to sell small appliances. In our homes we do not have extra wiring, and things are difficult to sell when there must be extra wiring.

Then we have indirect selling of major equipment. We don't sell ranges nor water heaters directly. Our girls are so organized that they work with the salesmen, so the salesmen can follow-up and sell equipment. The girl can do everything right up to the point of signing the contract and in some instances she has done it because the customer wouldn't wait for another call.

The selling course is educational. We are using group schools for that because it cuts our cost to a problem of getting a few users together, and that is particularly valuable in our territory, where the new users are such as line extensions. That means home calls, lighting equipment, lighting demonstrations and problem calls.

I know you are interested in the way that our selling is stimulated. We have tried campaigns in our home service department for the first time. The girls were a little annoyed because the salesmen had campaigns and got special recompense and they didn't. A year ago in June we started a three-months' campaign, which worked very successfully. The girls were enthusiastic about it, and it put them on a definite stand with the salesmen. Then in August we ran a campaign primarily to clear lamp stock before the Better Light, Better Sight campaign, and in August last year, normally a poor month for lighting equipment, the girls sold over 500 lamps, so August is not a bad month for sales if you can stimulate the girls to make them.

They are now on a three-months' campaign for small appliances on which they can estimate the dollar value of the equipment which they sell. In the beginning, we had a hard time getting them to measure for us the things we wanted done. If we were to prove our ability it would be necessary to measure what we were doing, so reports are an important thing for us. We have borrowed reports everywhere we could. The things we were interested in, as far as measuring the girls' work was concerned, was their gross sales for the month and for the year; that is, for the year to date. For example, through April, they were responsible for $2,682 worth of merchandise; for four months to date, $10,433 in merchandise. We are cutting down the department now because we know with the girls doing all the work we do not need so many girls to cover our territory as we had before.

We must measure the total salaries, because that is part of our operating expense. We measure commissions and bonuses, because that is part of the operating expense and because we are interested in what they are earning, as far as that is concerned. We measure mileage, which is paid on a flat rate. Our supervisors are paid on actual mileage. All expense, time, assistance, everything that can be included must be measured for basic cost, the gross amount earned in estimating annual revenue, the cost per dollar of the work they do, and this is the type of thing we are using now in our report, using almost exactly the same report as our salesmen use.

I just want to summarize a few of these things about why I think there is a need for women in the electric utility business: First, because of the influence of changing sales to home equipment makes it so imperative. It is much easier for a girl to sell to a woman than for a man to sell in the home. The girl cannot be too young, because a housewife has no confidence in a young girl. She wouldn't for instance, take such advice from a young daughter. But she will take some help from a woman whom she

(*Continued on page* 307)

Some Engineering Contributions to Society

By R. C. Muir

Vice President in Charge of Engineering, General Electric Co.

An Address Before the Fifth General Session of the Fifth Annual Convention of the Edison Electric Institute, Chicago, Illinois, June 4th, 1937

IT is now quite generally conceded that social and economic progress are dependent upon engineering or technological development, and progress in this direction has been greater in the last few decades than in all previous time.

Economic progress means that the average individual can obtain more and more from the results of his day's work, or in other words, the relation between wages and prices must show an increasing favorable differential. Lower prices and products of greater utility are obtained only through technological development, which I interpret to mean industrial research, engineering, manufacturing, sales or distribution, and management. Should a time arrive when the individual cannot obtain more for his day's work, economic progress ceases, so that the job of the engineer is never finished, it is a continuing thing. Putting it another way, industry's mission is to provide more goods for more people at lower prices. It is obvious that, should the wages of industrial personnel, which I understand represents something in the order of 40 per cent of the wage earners, increase out of proportion to the wages of the other 60 per cent of the buying public so that we would destroy the increasing favorable differential between the average wage and prices, we could not meet the above specifications of economic progress. This is one of the dangers confronting us at the moment, but I speak of it in that it is related directly to the task of industry in maintaining the favorable trend in economic progress.

In this paper I would like to limit the subject to the electric industry and with this limitation we might say: "Our engineering objective is—in power generation to produce more energy from each unit of fuel, in electric power distribution to reduce the transmission losses, and in electric power utilization to have each kilowatt-hour do more or go further." The publicity man phrases this objective as "Getting more for less."

It is not impressive to show our accomplishments in this direction in any particular way, so that I am going back

MR. MUIR

from 10 to 20 years and try to give you a perspective of what engineering has done over this period and some indication of where we are going. Everyone in this Institute has played a part in these accomplishments, so that each of us may justly take pride in his contribution. On the other hand the trends indicate that there still remains so much to be done that this presentation may also serve as an antidote to complacency or smugness.

Figure 1 on the left shows the annual production of electric power for public use in the U. S. by fuel burning stations. In the year 1920 twenty-seven billion kilowatt-hours were produced with forty-one million tons of coal, while in 1934 fifty-seven billion kilowatt-hours were produced and the coal consumption was just the same, forty-one million tons, so that through engineering we have been able to give the public more than twice the electric power without increasing the fuel consumption, a notable achievement in the conservation of fuel resources.

Figure 1 on the right shows the improvement in fuel power electric stations year by year and the performance of the best stations. You will note that it took fifteen years for the average steam station economy to equal the economy of the best station so that, if we look fifteen years ahead, we might expect the average steam station economy to equal the best of to-day, in other words, for each unit of fuel used then the electric power produced will be one and two-third times as great as is produced by one unit of fuel to-day.

Were it possible to have all fuel burn-

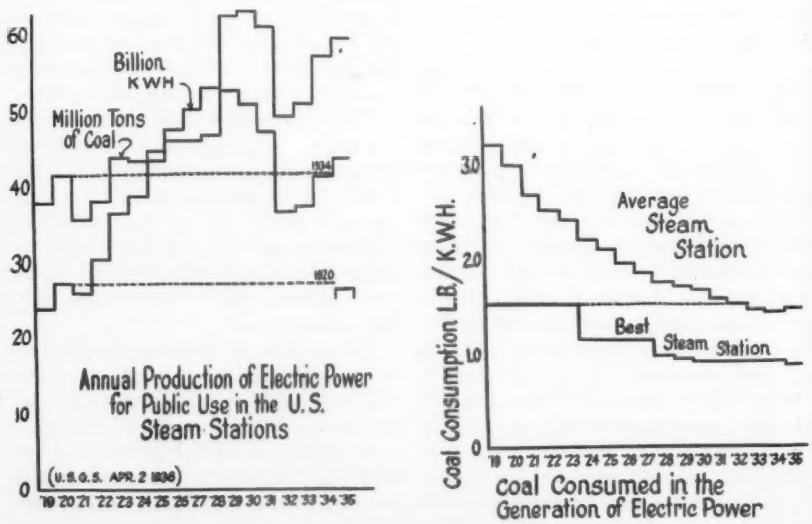

Billion KWH
Million Tons of Coal
1934
1920
Annual Production of Electric Power for Public Use in the U.S. Steam Stations
(U.S.G.S. APR. 2 1936)
Average Steam Station
Best Steam Station
Coal Consumption LB./K.W.H.
Coal Consumed in the Generation of Electric Power

Fig. 1—Coal Consumption Curves

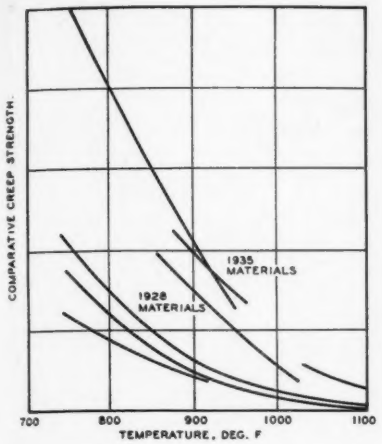


Fig. 2—Creep strength of Steel—former and present

ing stations equal to the best we would be using but twenty-six million tons of fuel to produce fifty-seven billion kilowatt-hours.

Fuel is only one item in the cost of power so that the engineer has not overlooked other items, the most important of which is reliability or high availability factor. Coincident with this improvement in efficiency, the reliability has increased, so that the capacity factor has increased and the power generated per dollar plant investment has materially increased.

It would be impossible in this short paper to cover many of the engineering phases that have brought about this improvement, but I shall spend a moment on the turbine generator as representative of the progress made and the problems confronting the engineer.

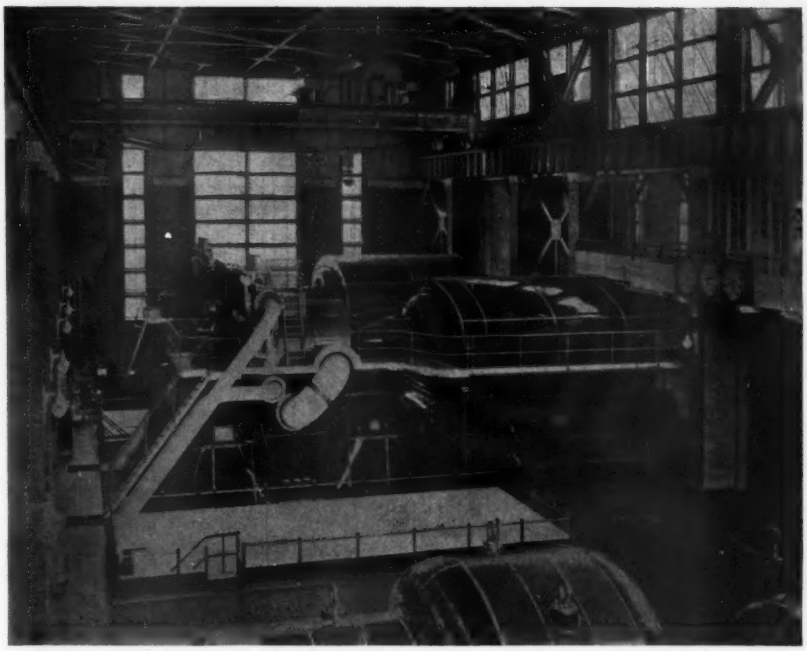


Fig. 4—2 G-E Vertical Compound Steam Turbine-Generator Sets, 110,000 kw. in power station of Ford Motor Company—River Rouge, Mich.

One of the most important factors in our recent power plant development is our ability to utilize high temperature steam: that is, 850° to 925° F. This is permitting an increase in the use of high pressure steam without resuperheating with its attendant complication, and gives a low cost, simple and highly efficient installation.

The ability to use high temperature steam has been dependent upon the development of alloy steels of high strength at high temperatures. Ordinary steels are subject to slow growth or plastic deformation called "creep" at these temperatures when under any appreciable amount of stress.

This precluded the development, up until a few years ago, of turbines to utilize steam at more than 750° temperature. Now, as shown in Fig. 2, we have materials which permit a stress at high temperatures of from three to four times what would have been permissible with the older materials. This makes it possible to utilize parts of practicable proportions.

One of the most outstanding ways in which the electrical industry has been "getting more for less" is in the superposition of high pressure, back pressure turbines on top of existing steam plants. These turbines take in high pressure, high temperature steam, develop a certain number of kilowatts, and discharge the steam from their exhausts into the present steam headers of the low pressure stations.

In this way it is possible to increase the capacity of present stations from 40 per cent to 90 per cent, depending upon the conditions.

Theoretically, the increased capacity should require an increased coal consumption chargeable to the capacity so installed of about one-third of a pound per kilowatthour. Actually, the increased efficiency of the new boilers required by the superposition so reduces

G-E STEAM TURBINE-GENERATOR SET
40000 KW 3600 RPM
For American Gas & Elec Co. (Logan Station)

Features

Turbine

1250 lb Pressure-925°F. Temperature.
(Red Hot) Highest Temp in any Large Turbine.
Double Shell.
Superposed on Present Station
Adding 86% to kw Capacity
and only 2% to Fuel Consumption.

Generator

Double Previous Maximum kw at 3600 rpm.
Runs in Hydrogen, Reducing Windage 90%.
Water Cooled Stator.
Aluminum Field Winding.
Full Load Losses only 1.4% (Eff 98.6%).

Fig. 3—40,000 kw. Logan Station Turbine Generator

the fuel consumption chargeable to the old station as to make the 40 per cent to 90 per cent additional capacity obtainable at only a slight increase in fuel consumption. That the industry is fully alive to this is attested by the fact that about one-third of the kilowatts in turbines which have been ordered by Electric Light and Power Companies during the past two years are of this type.

Figure 3 shows this type of unit—40,000 kw capacity, Logan Station, American Gas and Electric Company.

The remainder have, of course, been condensing turbines. One of the outstanding examples of this type of turbine installation in which "more has been obtained for less," is in connection with the Ford Plant at the River Rouge Plant at Detroit, Figure 4.

In this space of this plant there was originally installed two 12,500 kw G. E. turbines. Each of these new units, which occupies the same space as the original 12,500 kw machine, now develops 110,000 kw, nine times as much as the original. The fuel consumption is but 60 per cent as much per kilowatt-hour.

What it has done for instance to the building costs chargeable to each unit of power produced, you can imagine when you realize that an old building was utilized at nine times the capacity for which it had been originally designed.

An outstanding example of the value of engineering research in effecting a more economical use of construction materials, and greater economy of machine operation, is the development of hydrogen cooling as applied to rotating electrical machines. For years practically all classes of rotating electrical machinery were cooled with air, chiefly because it was more convenient to use air than anything else. Then research showed that this practice was wasteful, —that there were gases other than air in which machines would operate more efficiently and with a greater output per pound of material. Chief among these gases was hydrogen. This gas has a density only 1/14 that of air, so that the windage friction and ventilation losses of a rotating machine would be reduced to 1/14 of their value in air by operation in hydrogen. Also the thermal properties of hydrogen are distinctly superior to those of air, so that up to 25 per cent greater output may be obtained from a machine of given physical dimensions for the same temperature rise of the parts, by operation in hydrogen instead of air.

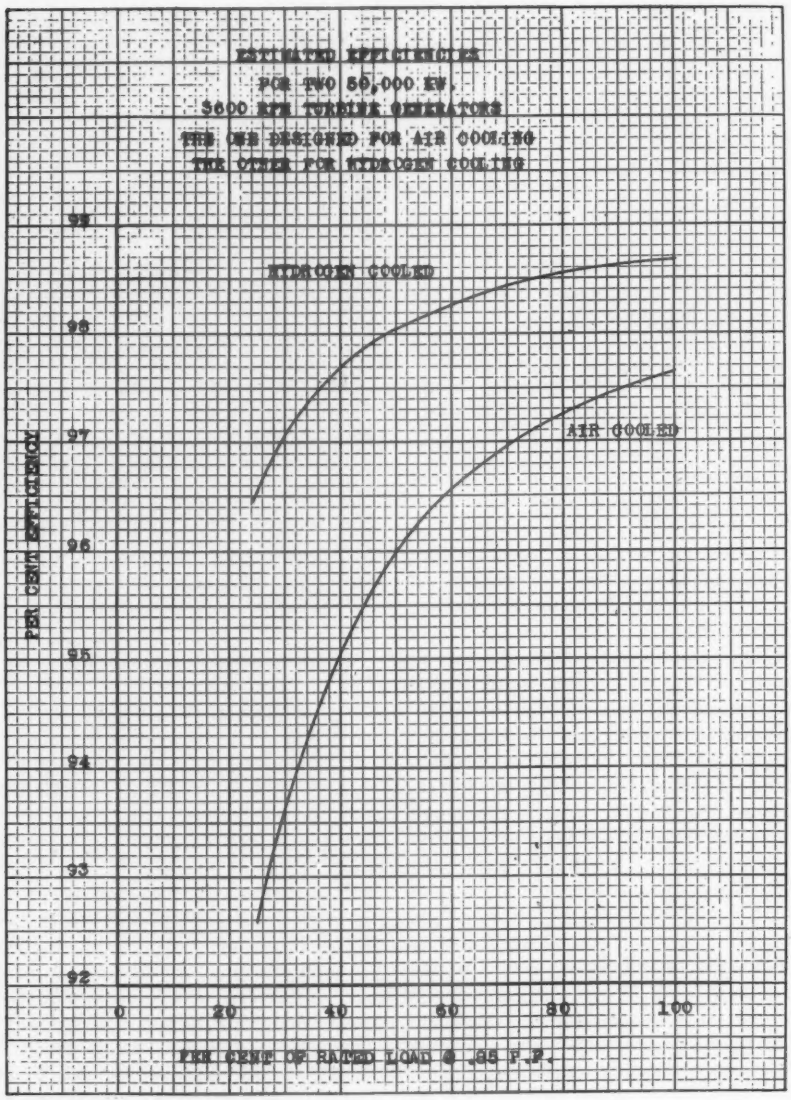


Fig. 5—Comparative Efficiencies, Air and Hydrogen Cooled Turbine Generators

The first applications of hydrogen cooling to rotating machines were to synchronous condensers and frequency changers, and so successful have these applications been, that in the past eight years 17 hydrogen cooled machines of these types, having a combined capacity of nearly ½ million kva, have been placed in service.

An even greater economic gain may be realized in the application of hydrogen cooling to high speed turbine generators. With this class of machines the windage friction and ventilation losses with air cooling comprise about one-half the full load losses; hence the use of hydrogen reduces the total losses by nearly one-half, corresponding to a gain of about 1 per cent in efficiency. Figure 5 shows the efficiency curves for two turbine generators, each of 50,000 kw capacity at 3600 r.p.m., the one designed for air cooling, the other for hydrogen cooling. It will be observed that the gain in efficiency by the use of hydrogen cooling ranges from 1 per cent at full load to nearly 4 per cent at ¼ load.

The commercial development of the hydrogen cooled turbine generator has just begun, but its importance to the industry is indicated by the fact that machines of this type, with a combined output upward of 1,000,000 kw are now under construction. The yearly fuel saving for these machines, as the result of using hydrogen cooling, will in itself represent a substantial amount.

As a further indication of progress in

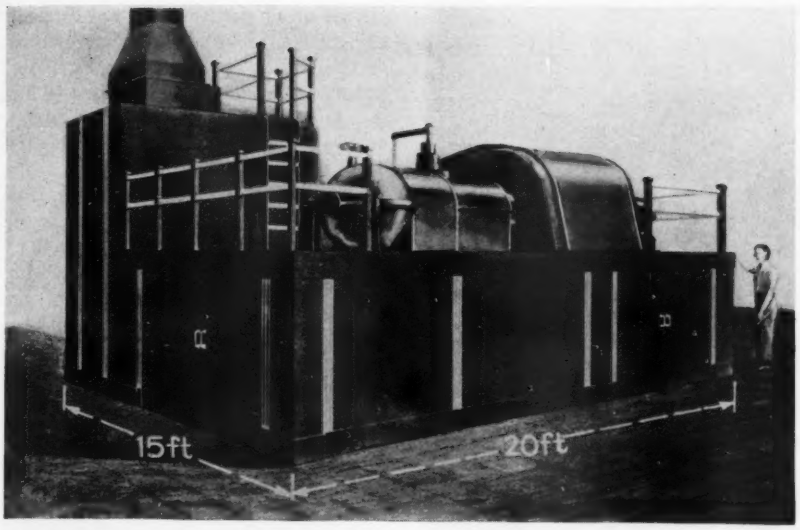


Fig. 6—A Complete Automatic, Oil-Fired, Steam-Electric Generating Plant of Modern Efficiency, Using Lowest Grade of Fuel Oil

power generation, Figure 6 shows a small unit power plant which has been recently put into service and represents a joint development of the Babcock & Wilcox Company, Bailey Meter Company, and the General Electric Company. This development was undertaken primarily for transportation and ship propulsion purposes, and two units are now being constructed for a steam turbine electric locomotive. The boiler is of the pumped through type, completely automatic, using the lowest grade of fuel oil, and generating steam at 1500 lb. per sq. in., temperature between 900° F and 1000° F. The objective is a compact, light weight automatic generating plant of high efficiency. Studies up to the present indicate that this might find applications in the field for plants of capacities from 1000 kw to 10,000 kw.

The mercury steam cycle offers possibilities of material improvement in economy over high pressure high temperature steam, but in order to realize the large gain that is inherent in the mercury steam cycle we must look forward to new alloy steels which can withstand higher temperatures.

Now that the power is generated we aim to see that we lose as little of it as possible on its way to the consumer and that it be delivered in suitable form as to constancy of voltage and under suitable conditions as to continuity of service or availability. This is not only a matter of larger electrical conductors, but rather a scientific arrangement of interconnections of conductors, placement of transformers, protective and regulating devices, and a reduction of losses in cables, transformers and regulating devices. The average distribution losses of power systems of U. S. in 1920 was 21½ per cent and in 1936 this loss has been reduced to 15 per cent.

The marked and continuing improvement of transformer efficiency has played an important part in reducing the distribution losses. Since 1920 the losses of distribution transformers have been reduced an average of 20 per cent, and the average full load losses of power transformers have been reduced 45 per cent.

Figure 7 shows the rapid advance in the design of network transformers, the figure to the left showing a transformer of nine years ago oil insulated, while the two figures to the right show two steps in reduction of overall dimensions of a transformer of the same rating filled with Pyranol. At the same time the efficiency has been increased from 98.5 to 98.7 per cent.

Paralleling this improvement it is interesting to note the progress made in paper insulated cable since 1920. Previous to 1921 the highest voltage underground cable in use in this country was three-conductor, 26,000 V, Y grounded. In 1923 the first 66,000 V single conductor solid type paper insulated cable was installed and in 1927 the first commercial installation of 132,000 V oil filled cable was put into service in this country. There are now in service approximately 900 miles of oil filled cable and there has not been a single electrical failure in this country. There is an installation of 230,000 V oil filled cable abroad. There is no cable operating at this voltage in this country, although laboratory and field tests have been carried on for several years to determine if 230,000 V oil filled cable is feasible and these tests are favorable.

The progress in high voltage paper insulated cable has been made possible due to improved materials, better manufacturing methods, and also the development of the oil filled cable. Thoroughly washed wood pulp paper has taken the place of the oil manila paper, and fluid oils have taken the place of the old petrolatum compounds. Low ionization has resulted due to much better vacuum equipment and filling of the cable with insulating oil, and the dielectric losses have been greatly decreased due to the improvements in the paper and the oil. The reduction in the losses on the solid type cable has been approximately 60 per cent, and on oil filled cable has been approximately 40 per cent.

Similar progress has been made in the

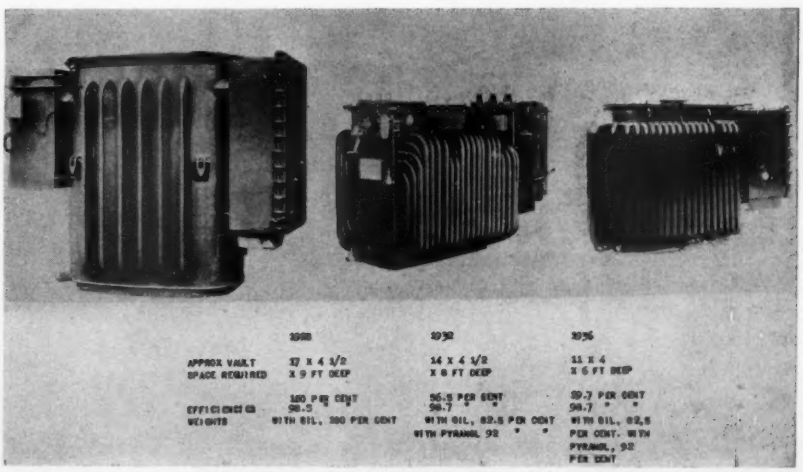
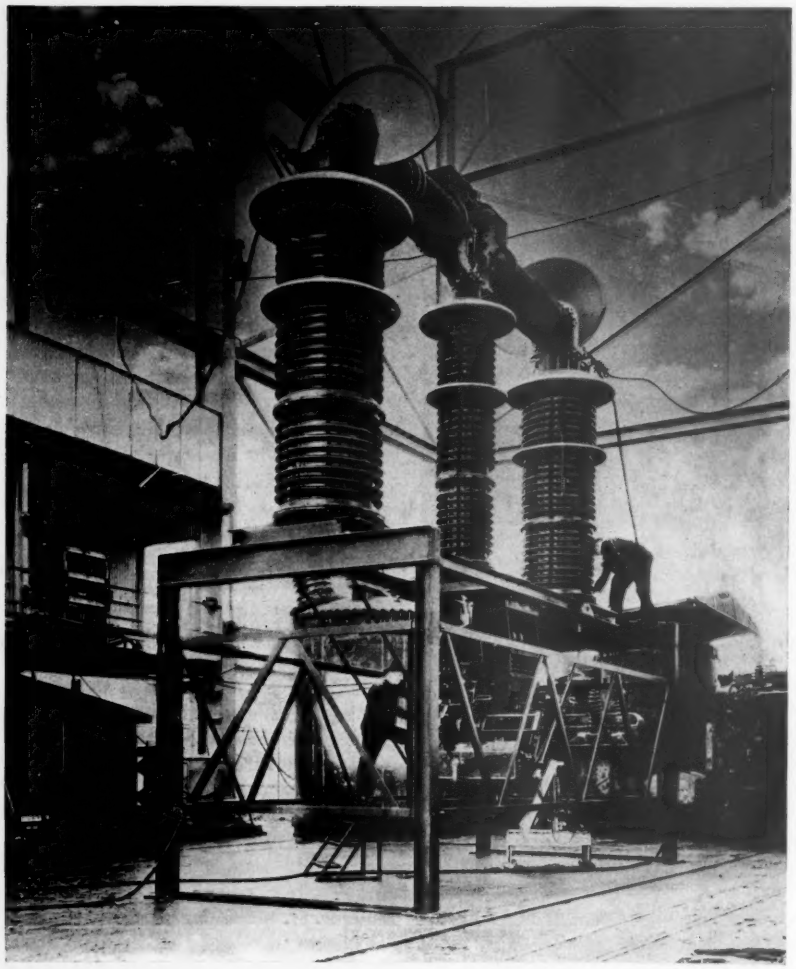

1920
1932
1936
APPROX VAULT SPACE REQUIRED
37 X 4 1/2 X 9 FT DEEP
14 X 4 1/2 X 8 FT DEEP
11 X 4 X 6 FT DEEP
EFFICIENCIES & WEIGHTS
98.5
WITH OIL, 100 PER CENT
98.5 PER CENT
98.7 " "
WITH OIL, 82.5 PER CENT
WITH PYRANOL, 92 " "
98.7 PER CENT
98.7 " "
WITH OIL, 82.5 PER CENT. WITH PYRANOL, 92 PER CENT

Fig. 7—A-C Network Distribution Transformers—Old and New



design of oil circuit breakers. Probably the most striking of these developments is the 287,000 volt impulse type high voltage oil circuit breaker shown in Fig. 8. As compared to the conventional type breaker the interrupting time of this breaker has been reduced from eight cycles to three cycles, the weight from 294,000 lbs to 113,000 lbs and the oil from 23,700 gallons to 2300 gallons.

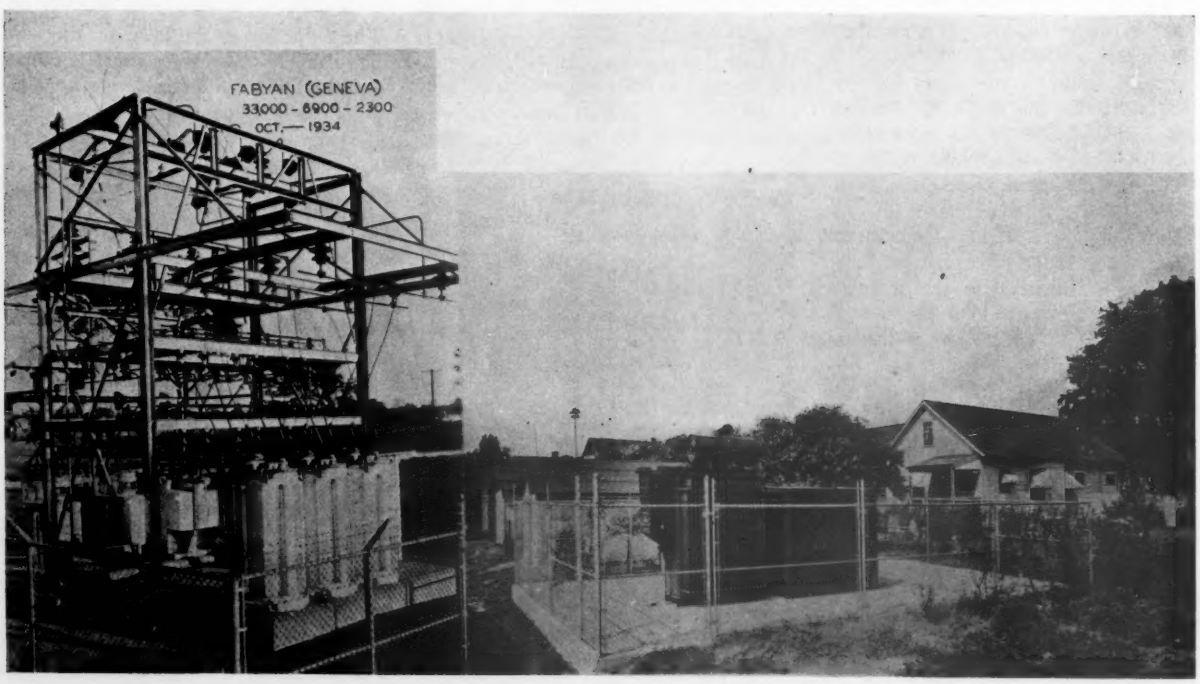
Similar advances have been made in low voltage, low interrupting capacity breakers, so that today a 50,000 kva, 15,000 volt oil circuit breaker weighs less than one-half and has less than one-half the oil content of the breaker available a few years ago.

Figure 9 shows comparative views of a conventonal type 1500 kva outdoor distribution substation and a factory built unit type substation of the same rating, indicating very marked progress.

Direct current transmission from many points of view is very attractive. It offers the possibility of operating

Fig. 8—Left—287-kv. Impulse Type Circuit Breaker for Use on Transmission Line Between Boulder Dam and Los Angeles, Cal.

Fig. 9 — Below, Left — Conventional 33000/2300 Volt, 1500 kva Outdoor Distribution Substation. Right — New 22000/2300 Volt, 1500 kva Outdoor Factory Built Unit-Type Distribution Substation



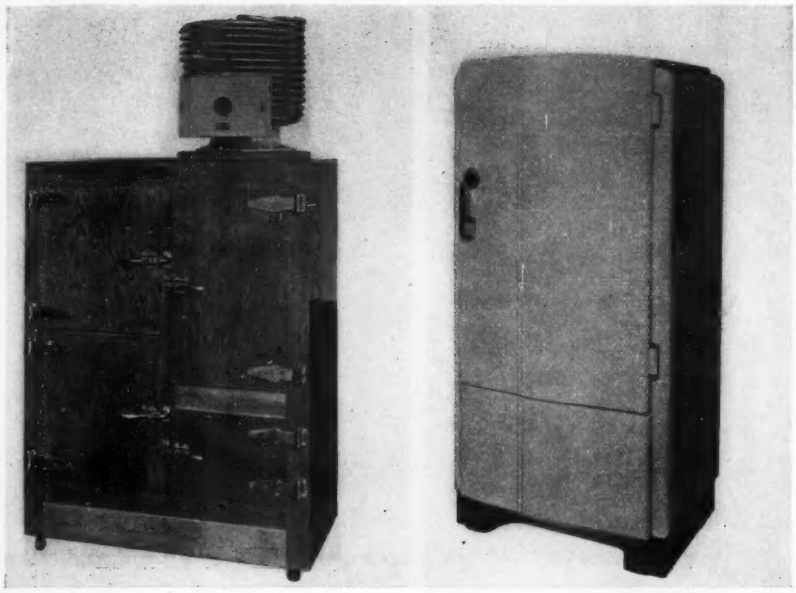


Fig. 10—Comparison of 1924 and 1937 Refrigerators

cables with negligible dielectric losses at greatly increased voltages with consequent reduction in cable cost, also a means of obtaining non-synchronous ties between power stations. We have a developmental installation but at present we should look upon this as just another step which we hope may ultimately come into commercial use and still further reduce losses of transmission.

And now coming to the utilization of power delivered to the household consumer, we aim to make each unit of electricity do more for him, and I will cite a few examples.

Fig. 11—Comparison of 1916 and 1936 Electric Ranges

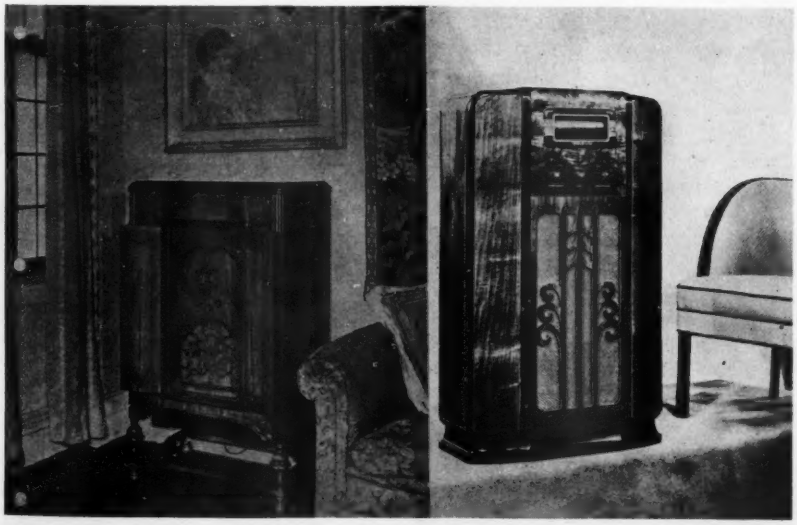


Fig. 12—Radio Receivers—1930 and 1937 Designs

More than 880,000,000 incandescent lamps were manufactured last year and for each kwhr used the user received one-third more light than he did in 1920 and each lamp cost him two-thirds less than the price he paid in 1920. At no time in the past has there been more activity in lighting research than at present. Illumination studies are under way on a more extensive scale than ever before and the illuminating engineers have many new types of lamps to experiment with—the sodium lamp, the high intensity mercury vapor lamp, and fluorescent lamps, all subject to further development.

There are in service today more than 7,500,000 household refrigerators. Today three electric refrigerators operate with the same electric power consumption as one required in 1924, and the user may purchase a much superior unit for less than one-half the amount he paid in 1924. Great advances have been made in styling or in improving the appearance of refrigerators as is shown in Fig. 10.

You all are familiar with the rapid increase in the use of electric ranges. Figure 11 shows the range available a few years ago and the range available today. The range of today is much superior in style and has a much higher heating speed, greater reliability and serviceability, and costs the consumer approximately one-half of what the range cost him a few years ago.

The progress in radio receivers has been even more marked in that it is a newer device. Figure 12 shows a high class radio receiver of 1930 and one of the 1937 models. The radio of today is

vastly superior in range of selection, selectivity, sensitivity, and acoustical fidelity, but the price to the user is two-thirds less than it was in 1930.

The washing machine has been improved in appearance, safety, quietness, life, and in effectiveness in washing the clothes with less wear and tear. Figure 13 is a reproduction of a snapshot of an old washing machine representative of the period before the enclosure of moving parts was thought of. Figure 14 shows one of the 1922 models, which is a great advance over the earlier types, and a model of the present type. Prices have steadily decreased so that today washing machines superior in every respect may be obtained at less than one-half the price of those available in 1922.

Similar advances have been made in other domestic devices, ironers, food mixers, toasters and heating appliances. A new household unit has appeared in the Disposall unit which mascerates the waste food from the kitchen and allows it to be carried away in the sewage system. I predict this will some day be as compulsory as the sewage system itself is today. The electrically heated blanket is just being introduced.

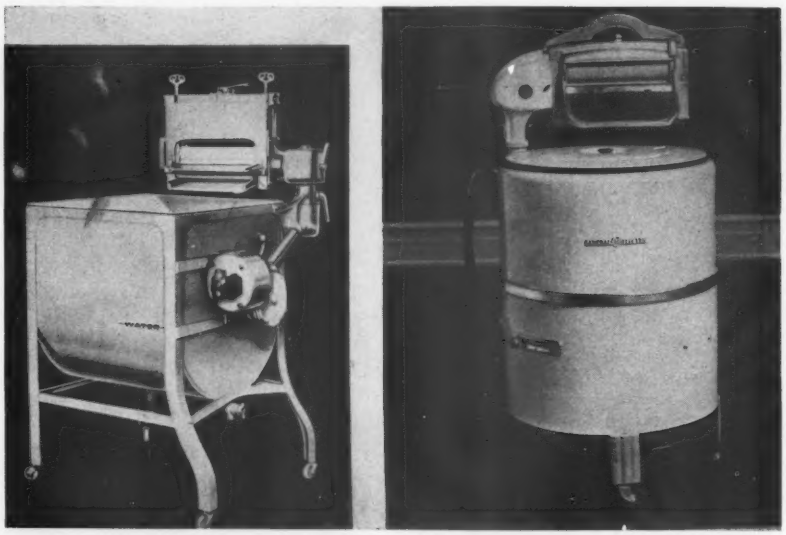


Fig. 14—Washing Machines—Old and New

Winter air conditioning is becoming well established and summer air conditioning is well under way for the larger establishments, but there still remains much to be done in summer air conditioning for the home.

This improvement in household and power consuming devices has been a matter of putting into them the same high technical ability, research and ingenuity as has been utilized in larger apparatus, and this must continue if we are to meet the specifications for economic progress outlined in the first part of this paper.

This presentation has been largely from the manufacturers' point of view but, as indicated earlier, everyone in this Institute has played a part in these accomplishments, and a presentation from the point of view of the Electric Light and Power Companies would be fully as

(*Continued on page* 301)

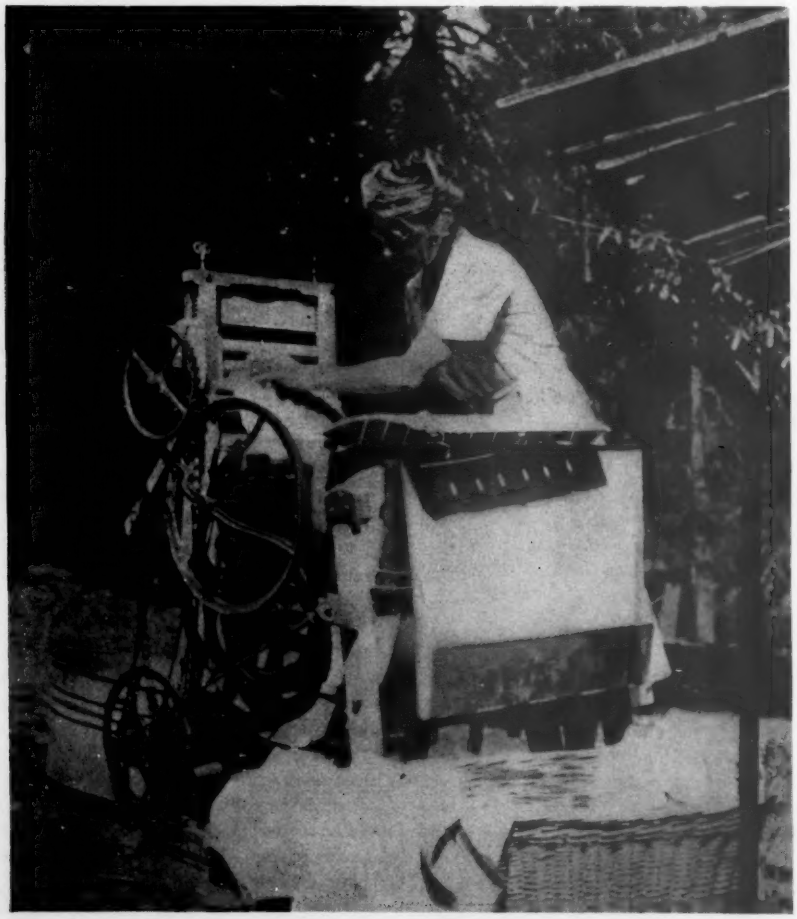


Fig. 13—Old Washing Machine in Operation

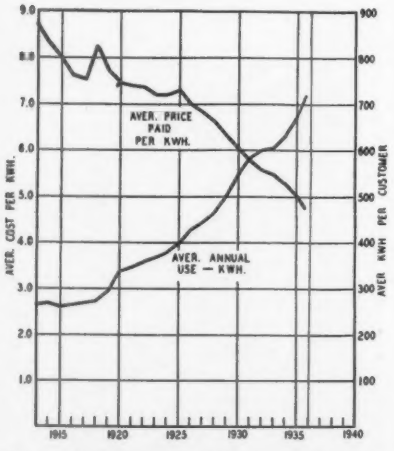


Fig. 15—Curves of Domestic Electric Service, Use and Price

The Status of Rural Electrification

By D. E. Karn

Vice-President and General Manager, Consumers Power Company

An address before the Fourth General Session of the Fifth Annual Convention of the Edison Electric Institute, Chicago, Ill., June 3, 1937.

(Delivered by Mr. H. J. Gallagher, Consumers Power Company, in Mr. Karn's absence.)

THAT Rural Electrification has become a definitely established part of utility operation and of our national rural life is emphasized by the fact that more than 1,000,000 farms in the United States were receiving electric utility service on December 31, 1936. In addition to customers classified and recorded as farm customers, it is reasonable to believe that more than 1,000,000 non-farm rural customers are also being serviced by existing utility distribution systems.

During 1936 the industry extended service to between 110,000 and 115,000 farms, bringing the present day construc tion up to its pre-depression level. The total investment for distribution lines is between three and four hundred million dollars. To serve these distribution systems, it has been necessary to invest many additional millions for power plants, substations and transmission lines. The remarkable part of the program is that over 85 per cent of the total development has taken place within the past 13 years and that four of those 13 years were depression years during which little construction work was done.

In addition to extensions made by electric utilities, there is the program of the R.E.A., now in its third year of existence. An interesting and illuminating comparison of the two programs was presented by Mr. G. C. Neff, Wisconsin Power & Light Company, before the Missouri Association of Public Utilities at Excelsior Springs, April 22 of this year.

Quoting from Mr. Neff's report:

"In the northern portion of the Middle Western part of the United States, the thirteen states including Ohio, Kentucky, Missouri, Kansas, Nebraska, North and South Dakota, Minnesota, Wisconsin, Michigan, Indiana, Illinois and Iowa, there were approximately 5000 farms receiving electric service through R.E.A. projects on Dec. 31, 1936. Construction work had actually been started on a number of cooperative projects which when completed will bring service to 15,000 more farms. In addition a number of allotments have been made for other projects on which no construction work has begun. However, when all construction work on R.E.A. projects is completed, approximately 20,000 farms will have R.E.A. service in this area. When this is compared with the 374,000 farms now served by private utilities who are adding more than 40,000 new farm customers each year, it would seem that the utility industry has done a creditable job of extending service to farms."

MR. KARN

What has happened in the 13 states mentioned is representative of the R.E.A. development throughout the rest of the country.

The job the utilities have executed so far has been a big job; but as big as it has been, the job ahead is much bigger and the problem becomes more difficult as lines extend further into the more thinly settled rural areas where non-farm rural customers decrease to the point that extensions actually become farm lines instead of rural lines.

Not only are the utilities faced with those natural difficulties of extending rural service that in themselves are sufficient; but they are also faced with harassing restraints imposed by state and federal regulations.

As creditable as has been this program, there still remains the question as to whether the utilities haven't proceeded in the past on a rather general hit and miss basis, each company being somewhat of an individual pioneer in a new field, and whether the methods of yesterday will answer tomorrow. The present seems to offer an excellent opportunity to capitalize on past experiences in presenting a united front by establishing, as nearly as possible, a national rural electrification policy for the electric operating companies.

Some of the problems of importance to the utilities that should be included in such a policy are:

1. The question of the rights of existing utilities to extend their service into territory not now served.
2. The question of wholesale rates to electric cooperative associations.
3. A study of the policies of operating companies as to their program for the occupancy of unserved territory.
4. The attitude of utilities toward rural electrification.
5. The purchasing power of farmers and agricultural trends that influence purchasing power.
6. Standardization in cost and design of rural lines.
7. Building load on rural lines.
8. Dissemination of information in the quickest time and in the most practical manner.

The question of the rights of existing utilities to extend their service into territory not now supplied with service is of mutual importance to most of the operating companies. This question should be studied from all phases of both the legal and practical side of occupancy of territory with respect to either cooperative acts in existence in the various states or the provisions of utility acts covering certificate of convenience and necessity and the tendency and trend among commissions to issue orders covering this phase of the problem. The objective of this study is to determine a method of procedure for the utilities against attack or prohibition of rural extensions.

The question of wholesale rates to cooperatives in all of its phases should be analyzed as soon as possible and full cooperation extended to the rate research committee of the Institute in compilation of information with respect to existing and future wholesale rates.

A study of the policies of operating

companies should be promoted to learn of their program for occupancy of unserved territory with respect to appropriations for such extensions together with an analysis of line extension plans. Such a study would reveal the essential details that have been proved successful by utilities who are actively pushing rural electrification and would assist the committee to formulate and offer suggestions for augmenting activity along this line.

It seems particularly essential that these three problems be viewed as uniform policies with respect to the operating companies' conduct in these matters, both with State Commissions and with cooperative groups. The value of such a program may be emphasized by the acknowledged and publicized attitude of the R.E.A. in Washington to establish, insofar as possible, uniform policies from their point of view, irrespective of state regulation and the problem of each local area and utility.

The attitude of utility executives toward rural electrification merits brief discussion. Any plan, no matter how good, is doomed to failure unless the executives actively support it; passive support is not enough.

During the past ten years, the attitude of utility executives toward rural electrification has changed. This problem was first met with a general reluctance and belief that it couldn't be executed. It was only natural that this attitude of the executives should be reflected throughout their entire organization. Suffice to state that at the present time utility executives in general are enthusiastic advocates of rural electrification, and a point of importance is that this enthusiasm should be extended throughout the organization to thoroughly dissipate any of the old prejudices that may remain. It is the men in the field that contact the farmers, not the executives, and the contact should be one of whole-hearted friendliness with a desire to serve rather than an attitude of granting a favor by rendering service.

The purchasing power of farmers and agricultural trends influencing purchasing power are so definitely a part of a sound rural electrification program that each operating company should have authentic information in this respect. Being familiar with local conditions such as markets, types of farming and the location of good and poor agricultural areas is not enough. The Federal program of rehabilitation, reforestation, soil conservation, crop subsidies, farm mortgages, cooperative marketing, import and export duties on farm produce are agricultural trends that affect local conditions and local utility investments.

In the matter of rural lines, much has already been done by the Transmission and Distribution Committee. However, engineers are still too far apart on standardization of cost and design and the efforts of the committee should be continued toward the standardization of sturdy, low cost lines. I recommend that the Transmission and Distribution Committee submit to the Operating Committee of the Institute a definition of a rural distribution line so that in talking in terms of the cost of a mile of line we will know what we are talking about, whether it is the pole and wire line only, whether the transformer is included or whether it is a complete unit, including transformer, customer's service and meter. Due to the publicity given low cost R.E.A. lines, which is generally based on the pole and wire line only, there exists a general confusion as to what a rural line really is. A mutual understanding on this point would be of advantage to all concerned.

Building load on rural lines. I rather hesitate to broach this problem in the limited available time because in the last analysis, this is the answer that all utilities have been seeking since the first rural line was built; and while the answer may be somewhat closer today than it was a few years ago, it is still beyond tangible grasp. However, it is one phase of the program that is flexible enough to be readily merged into a national policy. In fact the merging has rather generally taken place and may be enumerated as:

First—That the job of building load on rural lines is not primarily a merchandising job of operating companies, rather it is a job of education, the education of rural customers, especially farmers, to the many advantages and uses of service on the farm and the education of hardware and implement dealers and other merchandising agencies together with manufacturers as to the sincerity of the utility in its cooperative efforts and to the existing and potential local market for electrically operated equipment.

It is essential that this phase of the program be correlated very closely with that of the State College or University, the County Agricultural Agents, 4-H Clubs, and farm organizations, the Farm Bureau, State Grange and Farmers' Union. The success of the venture requires a well prepared plan and a trained organization under supervision to execute the plan. It is highly desirable that the personnel of the organization work on a straight-salary basis and devote their entire time to selling the value of service rather than selling merchandise.

Second—Rural merchandising by operating companies should supplement the educational program and be largely confined to a rural sales force and to domestic equipment and appliances.

It has been learned that urban salesmen without a farm background have difficulties in selling rural customers, especially farmers. It has further been learned that the merchandising of farm equipment other than domestic doesn't correlate with the general merchandising program of electric companies and that the companies merchandising farm equipment have difficulties in interesting local merchants to carry stock and push sales.

Third—To assist in both the educational and cooperative dealer programs, the rural sales subcommittee of the Sales Committee of the Institute could enlarge its present program. It has been suggested that the Committee set up local rural sales bureaus somewhat along the lines of the local refrigeration bureaus and local kitchen modernization bureaus. It seems reasonable to assume that bureaus of this nature would be given financial support by farm equipment manufacturers and that they would develop into an enterprise similar in nature to the Water Systems Council that has established a very commendable record.

The accumulation of information by subcommittees will have little value to the member companies unless the information is disseminated in the quickest and most practical manner. The Rural Electrification Exchange on energy sales in rural territory is illustrative of the possibilities of a broader program that should include within its scope the large number of non-farm rural customers as well as farm customers.

The execution of a program of this nature requires man power, this in turn requires further cooperation from the member companies in furnishing man power, and the allowance of necessary traveling expenses for committee members to attend meetings that should be held sufficiently often to secure definite results.

In conclusion, I emphasize the importance of rural electrification by merging the old axiom of "As agriculture goes, so goes the destiny of a nation" with the thought expressed by R. B. Matthews, British delegate to the Third World Power Conference, that "Agriculture and electricity must be inseparable if the farmer is to prosper as he should."

Commonwealth Edison's All-Electric Demonstration Home

MANY Convention delegates inspected the model all-electric display home of the Commonwealth Edison Company which opened June 1, coincidentally with the E.E.I. Convention. The Commonwealth Edison Company's electric home is early American in its architectural design, interior decorating and furnishings, as well as landscaping of the grounds, being typical of the colonial period. It emphasizes the convenience and economy of this modern household equipment, and its practical utility in small inexpensive homes. The home is completely air conditioned and all-electric cooking is one of its features.

New Products from Research in the Electrical Industry

By Dr. L. W. Chubb

Director of Research Laboratories, Westinghouse Electric & Manufacturing Company

An Address and Demonstration before the Third General Session of the Fifth Annual Convention of the Edison Electric Institute, Chicago, Ill., June 2nd, 1937.

I HAVE come before you today as requested to tell something about the new products of research and possibly to demonstrate them. I have selected three items which are supposed to illustrate that, a practical application, a suggestive item, and a speculative item. First, let me say something about the role of industrial research.

The older and larger industries were built on discoveries and inventions—in most cases accidental; or they were built through the application of knowledge gained through generations of cut-and-dry experiences. Our electrical industry started by this same old method and developed very slowly at first. Static electricity was first discovered about 300 B.C. Current electricity was discovered in 1790 in Italy by Galvani, after his wife had called his attention to the twitching of frog's legs when stirred with a metal fork. This led to the discovery of the electric battery ten years later by Volta. Then followed conduction, electrolysis, electromagnetic induction, etc.

All these and many others in the long list of isolated scientific discoveries are the materials upon which the electrical industry was built. It was a slow process and years elapsed between discovery and application.

Faraday's discovery of electromagnetic induction and the formulation of the laws of such induction were the very basis of electrical machines, generators, motors and transformers. At the time of the discovery, there was no realization of the value of this knowledge, yet it was the most important "building block" of our electrical industry. It took over 50 years before the first d.c. central station and the first a.c. distribution system were in operation.

An infant industry, when established, is usually assured of rapid progress. There is lots of room for improvement. With something fundamentally new and no competition, growth will proceed until limitations of materials, performance

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or methods of production begin to appear. It is the duty of the research worker to remove these limitations—he must develop new materials, new technical processes, methods of fabrication, so that the performance can be improved and the cost of production kept competitive.

The slow methods of the independent scientific workers and the delayed application will not suffice in these days of mass production and rapidly expanding industry. Industry has been mechanized. We have machine tools, line production, elaborate processes of fabrication, automatic operation, and a diversity and growth which brings an ever-increasing number of scientific problems to the research worker. We might also think of industrial research as being quantity production or mechanized research, in comparison to the type of scientific work carried on by the independent workers of the past.

The research work of a large company falls into three general classifications. First, improving, lowering the cost of the going products and "trouble shooting"; second, developing new materials and processes, and carrying out minor investigations for the engineering departments or shops in cases requiring fundamental or scientific treatment by specialists or with unusual laboratory facilities; third, doing fundamental and long-range work which has no immediate application in view. The work is carried on by "team work,"—by a corps of trained scientists working in the several branches of science.

The products of research are, in many cases, the raw materials and tools for the production and operating departments. They consist of new things, new treatments and scientific knowledge which will enable the engineers to design better, more enduring and new types of electrical equipment.

Any critical examination of current apparatus will show the enormous number of contributions which have been made during its development. A comparison with similar products of a few years back will clearly show how the minor and major changes in materials, methods of fabrication and new features of control, protection and operation help the designer and factory to meet the ever-changing requirements of the industries.

Usually the layman considers the evolution and advances of the past as matter-of-fact. He thinks of the latest models and styles of manufactured products to be the "last word" and visualizes no room for improvement. The research worker, on the other hand, is a temperamental type that never seems satisfied with things as they are. He has a love for "bug-hunting," searching for new knowledge, analyzing troubles and creating new things. As a rule, he is a creature for change. A research man doesn't know whether a 5 hp motor should cost $5.00 or $1,000—whether delivery dates are long or short, or what the efficiency may be. What he is interested in is changing to a lower cost, shorter production processes or doing something to improve the performance.

Electric Air Cleaner

I would like to speak of and show a new product which is being commercialized and which should be of interest as a load building device. It is an air cleaner, a substitution product that "does it electrically."

The development of air conditioning has made people more critical of our indoor atmosphere. Cleaning of the air is one of the many divisions of air conditioning—it is not a new subject, but an important one. The smoke and dirt problem is usually associated with the industrial cities, and smoke abatement activities have been quite effective in doing away with a greater part of the factory smoke which, in the past, was so disagreeable. The smoggy days continue in the large cities where soft coal is burned and when there is no appreciable movement of the atmosphere. This pollution of the atmosphere is, today, not due so much to factories, but rather to the thousands of threads of smoke coming out of residential and business buildings.

It seems as though we have gone about the air pollution problem in the wrong way. It is economically impossible to eliminate all smoke at the source. What we must do is to control the big offenders and then clean the air that is to be used in the buildings. It is like the water sanitation problem. Where the water supply for a city is taken from a stream, we do not attempt to filter and purify the full flow of the stream; only that water which is to be used is treated.

Nature's method of cleaning is by settling. Though you have still air you have dirt and dust slowly settling. The filter process is entirely too small for the very small particles. To give an example or to show the rate of settling, if we assume the particles are to settle ten feet, the particles that come through a 200-mesh sieve will take about half a minute to settle those ten feet. A fog particle will take about four and one-quarter to four and one-half minutes to settle. A silica particle, such as you have suspended in air after a blast in a mine, takes 24 hours to settle ten feet, black smoke particles about 11 days, and tobacco smoke settles ten feet in three and one-quarter months.

It is evident from those figures that waiting to clean the air by settling is not satisfactory, and nature has also provided other means. That is condensation. Each particle is a condensation nucleus upon which another particle forms. These are later gotten together by the noise of thunder and so forth until they fall and clear the atmosphere. Such methods have been considered but have not been found successful.

This electrostatic cleaner has been developed on the assumption that we are going to clean only the indoor air, to remove all suspended matter, dust and small smoke particles which are so detrimental to health, soil curtains, walls, and tax the patience and budget of the housewife. Air washing and filtering methods commonly used take out only the coarse particles and are wholly ineffective in removing the very fine dirt which is the most detrimental. The electrical system gets them all. The Cottrell process, used so successfully for certain industrial operations, was found absolutely unsuited for cleaning air which must subsequently be breathed, because of the generation of toxic ozone and nitrogen oxides. The new system is not only free from these troubles, but it is much more efficient and effective in operation.

In discussing air cleaning, we are not only dealing with particles of numberless substances, but also the shape and size of them may vary widely. As an example, the fine dust particles passing through a 200-mesh screen have diameters up to .0025. For most purposes, this is very fine material; but in terms of atmospheric pollution it is extremely coarse. The most common cause of hay fever consists of particles about .0008 in. in diameter, while the average particle of tobacco smoke is only .000,0039 in. in diameter. To get a better conception of these relative sizes, let us suppose that we could have a microscope with a magnification of 250,000 diameters. Through such a microscope, the average tobacco smoke particle would be about the size of a golf ball. The black smoke particles in the air would vary widely, but on the average, would appear to be the size of a baseball. Ragweed pollen would appear 17 ft. in diameter, while the particles which just pass through a 200-mesh screen would appear 50 ft. in diameter. With such a range of sizes, it is obvious that a filter with openings large enough for a free flow of air and small enough to catch the large particles lacks the ability to remove the extremely fine particles.

It has been customary to test the efficiency of an air filter by passing through it dust-laden air and measuring the amount of material taken out by weight. For some purposes, such a weight test will give a valuable indication of the amount of suspended matter in the air or taken out by the filter. However, when the particles are extremely small, such a test is almost meaningless. For example, let us assume that we have air containing one particle of the largest dust which will come through a 200-mesh screen to every 200,000 particles of tobacco smoke. The large particle would have a volume of about 200 million times that of the tobacco smoke particle, and if a filter caught the large particle and passed all of the small particles, a weight efficiency test would show 99.9 per cent, even though it had removed only one particle out of 200,001. This is, of course, an extreme case; but nevertheless important, for it is the small particles that float around in the air and cause most of the damage to health and soiling of walls. The large particles which can be caught by the ordinary filter settle out rapidly as loose dust and are easily removed.

I have here a card which illustrates the relative cleaning of a high grade mechanical filter and that of the new electrical device. The three samples were obtained by simultaneously passing an equal amount of air through a piece of Canton flannel. The first sample had outdoor air passed through it; the middle sample is for air which has been treated by one of the best modern air filters; and the last shows the effect of air which has been treated electrically. Very little difference between the soiling effect of the untreated and mechanically treated air can be seen, while the sample through which the electrically treated air was passed shows little or no blackening.

It may seem inconsistent to say that a mechanical filter is ineffective and then show that a cloth sample will become blackened by the passage of air through it. It is, of course, evident that to blacken the cloth, some dirt must be filtered out., However, you will appreciate what a small part of all the dirt passed through the sample is represented by this black spot, when I say that we have passed such air through seven pieces of cloth in series and the last one is practically as black as the others. This shows that such mechanical devices are ineffective in removing fine suspended matter in the air, yet it is a good test to show the soiling effect of the air. I have here a demonstration model of the electric filter and will show how effective it is in removing the very smallest particles; those of tobacco smoke.

This is merely a model to show the operation of the system. It is far from

being a practical device. In this air cleaning scheme we improve upon nature's method of settling out the dirt by giving it, you might say, a hand up, giving each particle a charge and then sending it through an electrical field. By doing this you get more than a million times the deflecting power that comes from gravitational forces alone. In this machine the charging of the particles and the deposition of them is carried on in two different compartments. To charge the particles you use about 12 kv and to deposit them about 6 kv. In this machine to make it simple, the same voltages are used in both functions. In the box is a power pack consisting of certain rectifying tubes, transformers, condensers, and so forth, with a little blower to such air through this smoking device and up through the cleaner. When the tobacco is lit in this cup the smoke will go down through some closed paper filters. You see that it goes right through the filters. It goes through and on up through here. When I turn on the high tension, the smoke particles become charged and as they pass between these widely spaced plates the particles are attracted to the plates. I will try it and hope it works. I have had a little trouble due to the moisture on some of these installations inside.

I dare say you can see the smoke going through the filters and up through the device, coming out at the top. When I turn on the high tension, the particles become charged and are deposited between the plates. I will turn it off again so you can see it. The power is now on again. The light background probably keeps you from seeing it. On again. Off again. So long as the power is on, no particles can get through this device.

In order to explain the advantage of electrostatic precipitation, it is helpful to first explain the difficulties with other methods.

Filtering, in the sense of providing pores so small that fine smoke particles cannot pass through, is impractical because such pores do not pass sufficient air. Centrifugal devices or attempts to impinge particles onto adhesive surfaces are ineffective in removing fine particles because such particles travel with the air to such an extent that only a small percentage of the fine dirt is caught.

Electrostatic forces acting upon such small uncharged particles are negligible. However, when charged with 10 electrons, the forces of attraction in an electric field may easily be made a million times as great as the gravitational force alone which nature uses to settle particles out of the air. This is the important advantage possessed by the electrical method.

Electrostatic precipitation consists essentially of imparting a charge to each dust particle and then attracting the particle out of the air. In former systems, both functions were performed in a single chamber. The charging is obtained by a high voltage corona discharge which produces ozone and nitrogen fixation. In our new system, the charging and deposition are separated, the voltage adjusted within a critical range, the electrical field so shaped that these serious objections are eliminated and the efficiency greatly increased. This precipitator is particularly adapted for use where the cleaned air is to be subsequently breathed by the occupants of a room. However, we have already found it to be applicable in many industrial processes.

Hay fever and types of asthma caused by air-borne pollen and invisible particles are quickly relieved. In many cases of asthma and hay fever, patients have obtained complete relief while they remain in the room where the air is electrostatically cleaned.

The cleaner is giving satisfactory service in cleaning the air in rooms housing the relays of automatic telephone exchanges. An unexpected application has been the cleaning of CO_2 gas ahead of the compressor in a dry ice plant. In certain processes of generating the carbon dioxide, there is a large amount of very fine suspended salt which is too fine to be removed by filters or washers but which the cleaner can readily remove. The use of a cleaner in this application very quickly pays for itself by reducing compressor maintenance.

Probably one of the largest applications is in air conditioning of residences in cities where soft coal is burned.

A word showing our possible interest of the device as a load builder seems to be justified. For an average dwelling, the actual energy for cleaning the air circulated in the hot-air system amounts to about 10 watts. In addition to this, the losses amount to about 40 watts and to circulate the air through the house, a blower requiring about 50 watts may be used. This gives a total of a 90-watt load of the most favorable type. It must be considered as a continuous load for about nine months in the year, and when summer cooling is also used, we might consider this load the year around. Certainly this should be an attractive item for the central station.

Polyphase Light

The second research product which I would like to speak of is something which we might class as suggestive of possibilities in the lighting field, especially for decorative and colored window displays, talking signs, or advertising devices.

It is based on the use of polarized light or several components of polarized light of different colors. For convenience, we may call this "polyphase light."

Ordinary light may be said to be a wave radiation in which the vibrations oscillate randomly at right angles to the direction of propagation. The color of light is determined by its frequency of vibration. Any color may be obtained by mixing several frequencies together and may be changed by filtering out various frequency components. Thus, if we want a red light, we may place a filter before a Mazda lamp which absorbs most of the components of white light and transmits the frequency, giving the sensation of red.

Such color filters act by subtracting the light not desired and there must be a source of light for each color to be used. What I am going to show is a means of getting color effects by selectively mixing the different colors and changing the colors in any desired way with filters which absorb different frequencies depending upon their angular position.

This demonstration is suggestive of the possibilities as already stated, and not supposed to be in any way artistic or a finished product.

To save time, the demonstrations are shown in their simplest form. To get the desired effects, the light must be polarized by passing it through a suitable screen such as I have here. Polarized light is light in which the vibrations have some regular motion; plane polarized light has the vibrations in a single plane; circularly polarized light may be said to have a circular motion, and elliptically polarized light, an elliptic motion.

Our demonstration will be with plane polarized light.

A screen of this kind consists of glass or other transparent support coated with a layer of material which passes light vibrations in only one direction. The material used is a complicated salt of quinine discovered about 85 years ago. It has the unique property of allowing visible light to pass through it when the vibrations are perpendicular to the crystal axis and stopping light vibrating

parallel to the axis of the crystal. To obtain a screen of this kind, this crystalline material is chemically produced and mechanically oriented so that all the crystal particles are parallel to one another.

I have here a ground glass window illuminated with natural light from a projector in the rear. If I place this screen before the light, it will be noticed that it lets the light through. The light which comes through is polarized, let us say, with vibrations in the lengthwise direction of the screen. Now a similar screen placed over the first and in the same direction lets the light come on through as the axes are coincident. If now the second screen is rotated, only the component of vertical vibration in the direction of the axis of the second screen can come through. When the second screen is turned 90 deg. there is no such component and the light passing the first screen is stopped by the second.

Now let us assume that the background transmits white light composed of the proper amounts of three primary colors—all polarized in a vertical plane. If I hold an analyzing screen before the light in the horizontal position, it will pass no light. If now the plane of the polarization of the red is rotated, red will come through the screen, and the intensity will depend upon the angle of rotation. The other two component colors can be rotated separately and made to come through in the same way. Thus any mixture of the primary colors can be obtained by adjusting the azimuth of each to the proper angle.

You may say that any desired color may be obtained by mixing various amounts of colored natural light. Such is the case, but the advantage of the new system is that local areas of pictures, diagrams and letters may be formed by the rotation of the various colors and give local and changing color effects.

This can be done conveniently with cellophane of a certain thickness arranged at various angles of orientation. Cellophane is a birefringent material with interesting optical properties. Natural light passed through it emerges vibrating in two planes parallel to and perpendicular to the grain of the material. It also has the property of changing the relative phase of the quadrature vibrations in such a way that it shifts the plans of polarization.

First, I would like to show an application of single-phase light, in which all color components are vibrating in the same plane. It is applicable to vehicle lighting and allows an ample illumination of the road for driving and, at the same time, eliminates all glare from approaching headlights.

I spoke of cellophane shifting polarized light. In the demonstration just shown, half of the illuminated area was polarized at one angle and the other half at the other angle. This was done by hanging a piece of cellophane behind the screen and covering the right-hand half. Let me illustrate how it works.

I spoke of selecting colors and making different parts of elements or letters of a picture or sign give the desired color. I have here a screen made of strips of red and green cellophane, the strips of one color being cut lengthwise from the original sheet and the strips of the other color being cut at 45 deg.

If it is placed before the projector in the rear, the planes of polarization of the two colors are changed so as to be in quadrature, and either color may be selected anywhere in the field of light by the proper orientation of the element of our picture.

Although it is convenient to use color screens, it is not necessary, for cellophane will make its own colors if multiple thicknesses oriented at certain angles are used. Treatment by this method is rather complicated, as it is difficult to work out the proper combinations to give the vector components the right direction and magnitude. These colors would be very much brighter using circularly polarized light from the projector.

Here is a screen made of red and blue as nearly complementary as I could select. You will note that the blue area greatly predominates over the red, because the incandescent lamp has a lack of blue and a predominance of red light. If this screen is put over the projection light, it gives substantially white light on the ground glass. If now this second screen is placed before the ground glass, you will note that the two colors are sorted out so as to give the letters and figures as desired. If I now turn the screen over, you will note that the two colors are re-sorted so as to form an American flag. If the screen in my hand is turned at a different angle, you will notice that the colors change as it rotates; or I can hold the screen still and the colors can be made to change by rotating the azimuth of the different color components by rotating a piece of cellophane.

In this simple device, all that is necessary is to paste cellophane letters and strips on the two sides of the polarizing screen. Only the cellophane between the light and the polarizer is effective—cellophane outside has no effect.

It is hoped that considerable use may be made of this method of using light and we feel that it can at least be used for a time for mysterious window displays.

Pioneer Research

As a third topic, I would like to say something about pioneer research. Such work is most difficult to justify at the time it is being done. However, experience has shown that the great advances in the world come from fundamentally new knowledge.

The concepts of the nature of matter, the theories upon which physics and chemistry are based, and all scientific knowledge have gone through many stages. New theories come and go, and with such change and with the acquisition of new knowledge, industry and living conditions progress.

The ancients believed that there were but four elements—fire, earth, air and water. Science has taken us up through 93 elements, supposed to be fundamental, indivisible and indestructible. The classical physics grew to maturity and we were taught in mechanics, physics and chemistry that elemental matter was indestructible. We were also taught the conservation of energy; that it may be transformed or converted or rendered latent, but that it could not be destroyed or created. Later on, the atoms of the elements were found to consist of a positive nucleus and some loosely-bound electrical charges which we call electrons. Through this knowledge, we began to understand the phenomena of ionization, gas conduction, arcs, etc., and took advantage of it to develop tubes, lightning arresters, circuit interrupters and various other devices. Progress was retarded because there was no definite understanding of the electron until Millikan, in the first decade of this century, by his classical experiment, completely identified this negative particle by measuring its charge and determining its mass. What was the result? A new wave of quantitative scientific work which told us what electricity is—how it works. Told us about electron emissions; metallic, gaseous and vacuum conduction; photo-electric and photo-chemical effects and other things which brought forth useful electrical equipment.

From all this, we might say that the electron has been extensively put to

work. Electronic devices of many kinds have been developed and a billion dollar radio industry has resulted.

Years ago, the physicist identified alpha, beta and gamma rays coming from radium. Alpha particles are the nuclei of helium atoms; beta particles are high-speed electrons; and gamma rays are photons, the particles of light radiation which always travel at a constant speed.

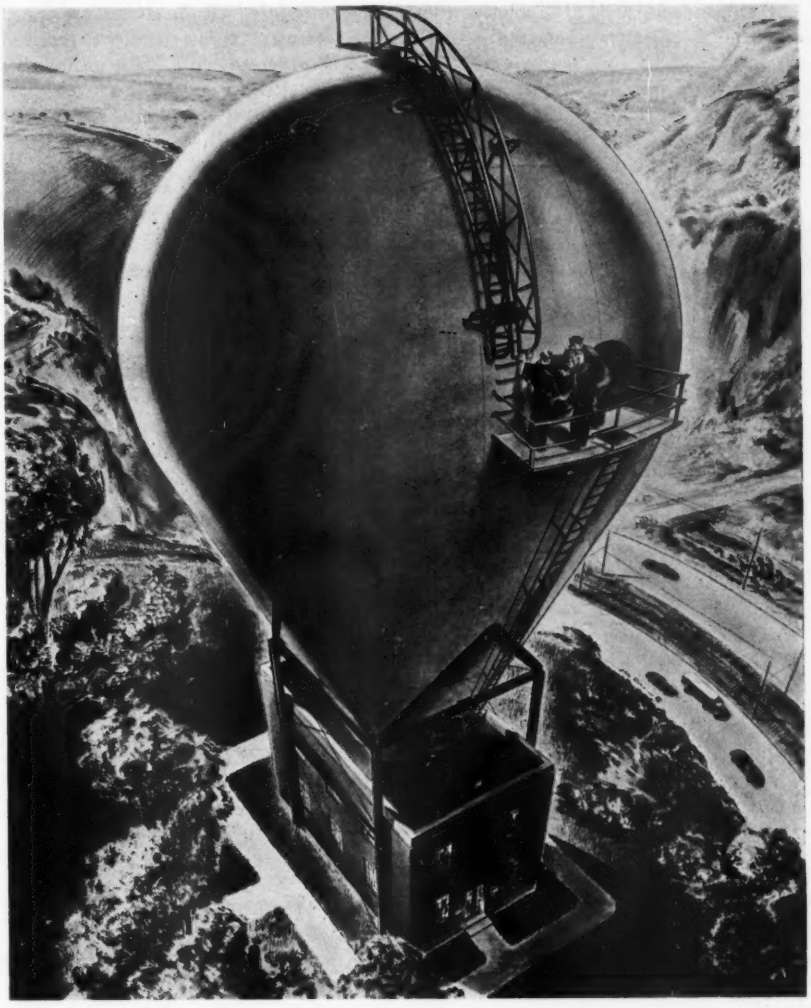
Since all these came out of radium as its atoms explode, it was evident that the nucleus was not indivisible and a theory arose that all matter was built of helium and electricity or electrons.

In 1932, Chadwick discovered the neutron, a new particle of matter which we may call a new element with no electrons needed to neutralize it. Then in 1933, Anderson in California discovered the positron, the counter part of the electron, but with a positive charge. The new knowledge of Einstein's relativity, quantum mechanics, the relation between mass, energy and velocity, together with these newly discovered particles, has started a new scientific revolution which, we believe, will have far-reaching results. The new theories indicate that matter can be destroyed; that energy may be changed to matter and matter to energy.

Electrons colliding with gas molecules produce ions; bombarding heavy metals produce radiations which we call X-rays. It was natural to expect that electrons and other fast-moving particles would produce changes in matter and other types of radiation. High velocity alpha particles, protons and deuterons and slow-moving neutrons have been found to split or enter the nucleus of elements making new types of unstable radioactive material which disintegrate into the stable nucleus of another element.

The nuclei of most of the elements have been split by such treatment. They have been rendered artificially radioactive. In this state, they are like radium, give off atomic energy and change into something else in settling down into the stable form of another element.

Thus the elements have been transmuted one to another. The question is often asked whether it will ever be possible to commercially change one element into another, and thus increase the supply of the rare elements. The question is also asked whether it will ever be possible to release for our use the enormous amount of energy stored in the atoms of matter. The methods of today for transmuting one element into another are so inefficient that there is no reason to believe that any practical commercial process will ever result, or that we will ever be able to obtain more energy from the atoms than we expend in releasing this energy. It is however, not safe to predict that such things will not be done in the future.



Westinghouse "Atom-Smasher"

First drawing released by the Westinghouse Electric & Manufacturing Company to show the exterior appearance of its huge "atom-smashing" equipment now under construction at the company's research laboratories at East Pittsburgh, Pa.

The huge pear-shaped tank, 30 feet in diameter and 47 feet high holds air under pressure of 120 pounds to the square inch providing additional insulation for a 5,000,000 volt electrostatic generator which accelerates streams of ions down a long vacuum tube housed within the structure.

We have a science which we call chemistry. It deals with the synthesis, the separation and recombination of myriads of chemical compounds by reactions which are produced by different combinations of reagents, operated on by thermal, mechanical and catalytic processes. Through the science of chemistry, we learn how to duplicate what nature does, how to change things and how to create new products.

Chemical reaction involves the rearrangement of atoms into various molecular combinations. In it, each of the so-called elements remains unchanged and must be considered as the ultimate raw material of the chemist.

Just as the chemist produces reactions with atoms and molecules, the physicist is producing nuclear reactions. The chemist must learn processes, reagents and catalysts to make his reactions take place. The physicist must learn the particles, the energies and the sequence of operations which will give nuclear reactions and transmutations of one element into another.

This new branch of science has not gone very far; however, it is extremely

active and seems to justify intensive fundamental work for possible future applications.

Experience has shown that we learn new things by doing and by logically following out quantitative experiments with the different variables under separate control. With the hope of advancing our knowledge in nuclear reactions and giving something which may be applicable in the future, we are greatly extending our fundamental nuclear physics research by building large equipment in which the high voltage will be directly applied to the charged particles which are used to bombard the material to be reacted. We think that this new equipment will have important new features, which will allow quantitative work of great value.

The "Atom Smasher"

I should like to describe this atom smasher; as they call it. I like to call it a gun. I have some statistics on this what we might call a super machine gun as distinguished from the submachine gun.

The weight is 100 tons. The barrel length is 35 feet. The range, that is, muzzle to target, is about 4 feet. We use several types of ammunition. They are all charged particles. We can only use one at a time. You can use a porton, or a deuteron, or an alpha particle or an electron or some such elemental ion. With this gun the marksmanship is not so good. You make one hit in about one million shots, but when we consider that there are about ten million million bullets per second, we are making a hit at the rate of ten million hits per second, which is not so bad. Then we look at it in another way and it is pretty poor. With bullets shooting at that rate and hitting at that rate, it would take about 200 million years to change an ounce of aluminum to the next one in the table. The velocity of particles is rather interesting, too. They have a velocity of from 30 to 100 million miles per hour. That speed is a little bit more than a tenth of the speed of light. The rating of the device may be interesting before it is described. It has a current of ten microamperes and a voltage of 5 million volts. That is an output of 50 watts and the input is about ten kilowatts, so the efficiency is not so hot.

I should like to describe the thing. Briefly, it consists of a curved pressure vessel, steel, about three-quarters of an inch thick, about 47 feet tall and 30 feet in diameter at the widest part. It is mounted above the second floor of a laboratory in which the studies are made. The reason for this pressure vessel is that in order to work with millions of volts it takes an enormous current and the deflection effect of air, of course, goes up practically with the pressure. Therefore, we may have five million volts difference between the legs and the tank without a spark. The distance decreases as we come down to the ground.

The device consists of this central column made of porcelain supports and different metal parts, then a bunch of cores or rings, the rings divided or graded from the top down to the ground in equal steps. The central column here is the vacuum tube or, we might say, the barrel of the gun, and it is about 35 feet long. The window for producing nuclear reactions with the high speed particles is down at the bottom part here. There is a magnetic analyzer that separates the particles that have different intensities. For instance, an alpha particle might start off above with a charge of one or a charge of two or a charge of three. When it comes down here, the ones that are not wanted are discarded by the magnetic analyzer. The targets are put in these three windows. That is where the reactions are taking place. The reactions are compiled by our men, are counted and listed by characteristics, and so on. I have not time to go into the method and detail on that particular part.

This is the business end of the big pressure tank. I want to show how we get the charges up at the top. These are the familiar belt type electrostatic generators. The belt is sprayed with a charge and it is carried up against the field and is then used to ionize the particles up above. There are two of these barrel chargers, one charges going up and the other charging on the opposite side coming down. The third belt here is run by a motor so as to light the filaments and operate the devices up here.

There are a lot of problems to work this out. We don't know whether it really works out all the way. The thing is about half constructed. It is being done by a Chicago firm that does structural work of this kind.

This is an artist's idea of what it is going to look like on the laboratory lot. I show it to you for what it is worth.

Although at present the only products of this type of research are artificial radio-active materials which may be used in therapy, we feel justified in going ahead as it seems today the best method of learning the secrets of nature, and feel confident that the new knowledge will bring forth new things or at least supplement our present activities which are becoming so diversified.

Nobody knows what may come out of this fundamental work, how applications will be made of the knowledge gained. Nobody knew that the twitching of frog's legs in Galvani's kitchen would turn out to be anything important. Nobody knew that the electron would be extensively put to work. Nobody knew that Faraday's parlor tricks for moving a magnetic needle and inducing currents would result in the great electrical industry. We do know, by looking back at these things, that the acquisition of scientific knowledge improves living conditions and advances our industry.

Education and Light

(*Continued from page 276*)

search was an inspired research planned primarily to sell goods. You will find the competent universities of this country are not only capable but willing to carry on that kind of research if the industry makes that possible.

The next point is proper education of the public as to what we already know in this field. I have myself felt so certain of the need for such education that we have recently planned in the publication called "Hygeia," the health magazine of the American Medical Association which now circulates approximately 120,000 copies and 35,000 of those to the public schools, a series of articles on the relationship of vision to light and light to vision, in order that this knowledge which is so important to the health of the American people may have a much wider dissemination. We have obtained the services of five or six leading eye specialists in the United States to cast up these series of articles.

The modern man uses every one of the modern facilities for extending knowledge; the radio, the billboard, the motion picture, the talking motion picture. All these are necessary if you want to extend knowledge to the vast majority of the people. Until the vast majority of the people are aware of what light means to vision, of how light is to be extended to the people, of the actual significance of a foot candle—until they have talked as familiarly about foot candles as they now talk about degrees of temperature, you will not have accomplished the most that you can accomplish in this field. Thank you.

Some Progress Toward Electric Homes In Conservative New England

By Walter A. Forbush

Vice-President, Edison Electric Illuminating Company of Brockton

An address before the First General Session of the Fifth Annual Convention of the Edison Electric Institute, Chicago, Illinois, June 1, 1937

YOUR commercial chairman has asked for a story of the work we have been doing in our company, although he knows that we lay claim to no panaceas, that we have done nothing unique or startling, but have obtained results above the average against real handicaps.

I think he believes that if you hear a story of some progress obtained in rock strewn New England, you, in the rest of the country will immediately figure how much greater results you can obtain. You know we New Englanders as rather quiet, matter of fact folk, not easily susceptible to emotional appeal, rather holding to our traditions of counting our pennies and even today taking pride in being known as thrifty.

I believe that while your true New Englander might be ashamed to admit it, he is either an idealist or the possessor of a conscience that sets for him a high standard of action. However, he prides himself on not allowing this to blind him to practical every day affairs. Again, I think that New England tradition and history prove that when a calm and unemotional analysis shows that real opportunities exist, there is a readiness to go far to grasp them and a willingness to try previously uncharted courses.

New England fields are rocky and we have learned by hard experience that if we are to have any results worthwhile in our electrical development, as well as in our crops, we must look carefully over our fields, remove the obstacles and work a bit harder because of the delay they have caused us.

Our company for years has had a very high standard or ideal of community service, has tried to have a clear and undistorted vision of opportunities and the obstacles in their way, has worked endlessly removing the obstacles to progress and has adopted one method after another that offered fair promise of success.

If I personally were to choose a single factor as of greatest importance in such advance as we have made, I would take the community attitude of friendliness

MR. FORBUSH

and belief in the honesty and sincerity of our company. You may ask how we can be sure of this. We cannot ever be sure, but we have had repeated evidence and one recent incident was most pleasing.

A national magazine sent through our territory an agent who went from house to house asking various questions. One of these was, "What company, and we do not suggest that this be a local one, do you consider to have the highest ideals of customer and employee relations?" The preponderance of replies was so uniform that the agent came to tell us. Ninety per cent said, "The Brockton Edison Company." We are proud of this and are trying harder than ever to justify it.

It may interest this group to know that one who in the early years of this company had a real part in setting up ideals and standards for the company is the present President of the Institute, Charles W. Kellogg.

Very briefly, let me give you a picture of our territory. We are a small company, serving an area of approximately 300 square miles with one city and sixteen towns. We have about 41,000 customers, 35,500 of these residential. The area is industrial, but with a good share of single homes, and a general wage scale somewhat above the mill town standard. We do not have any considerable areas of the type which, near most large cities, form the residential districts for the higher and middle salaried groups of the professional and commercial classes. The population has not been growing and in some towns has been decreasing. Consequently, the proportion of new homes is less than that of most territories. Tradition and climatic conditions have set up certain barriers to changes in housekeeping methods. For years, the kitchen range took care of, not alone the cooking, but heat for the room and in many cases, hot water. Through half the year, a box set outside the kitchen window provided such refrigeration as was deemed necessary. If there was a real supply of hot water, it came from the house heating system which operated at least seven months of the year. Finally, those who thought they were modern had taken service from a gas company that covered the territory quite completely.

Our company began to merchandise in 1914, primarily because no one else was interested in promoting electric irons, toasters and the minor appliances that were then available.

Very early we discovered that our first obstacle to adding to the electric load was the almost universal requirement of a new service with any additional load. In 1924, we took a stand that many thought was arbitrary. Our friends in neighboring companies frankly told us we were crazy. However, with the cooperation of our local inspection officials, we require for any new home or whenever a change became necessary in an old one, a three wire service with three No. 8 wires in a one-inch pipe and a 60-ampere switch. We also conferred with the National Board of Fire Underwriters and obtained their approval so that when a range was installed, the eights could be

pulled out and replaced by sixes in the same pipe.

This was a distinct help for two reasons. The sixty to seventy-five dollar cost of a service change was out and, from an operating standpoint, the three-wire supply allowed oil burners and other small service motors to be connected at 220 volts and eliminated much of the flicker that they caused on 110.

Even before this, we had taken a step that many considered unwise. We were finding so many homes entirely unwired or quite inadequately wired and new homes going up without sufficient wiring that in 1919, we offered to finance home wiring, collecting on so-called easy terms. From 1919 to 1929, with this plan, we put electric service into 18,000 homes.

When electric cooking began to be a real possibility, we believed that we were at least partially ready and we studied the situation carefully. Our first venture perhaps reflects New England conservatism. We began to actively push bucket cookers. In 1926 we put out 250 and this increased until in 1929 and 1930, we sold 2,600.

We did connect a few real ranges and we checked as carefully as we could their takings and their requirements. In 1930, we believed that before going further, we should make the best possible engineering analysis of the probable effects of a large increase in this sort of load on our system. We took sizable sample areas, one in a small outlying town and extending into rather sparsely built territory, the other in the city in a populous residential area. We checked carefully our physical plant serving each of these sections. Then using the best data we could collect at that time, we made projections into the future taking arbitrary saturations of major appliances and calculating the investment in lines and equipment from the customer to the station that these loads would require. The resultant balance sheet was checked and rechecked, and even so, later experience has shown us that there were large errors. I believe that errors on both sides went far to offset one another. Suffice it to say, it showed a satisfactory percentage accruing to net and we decided to cultivate the field as actively and persistently as we could.

As an early step, we further liberalized our service entrance policy. Beginning in 1930 with the approval of the Massachusetts Department of Public Utilities, we accepted as part of the company's plant, the service to the meter. Since we had done this for years in our underground areas, we considered it to be only consistent to do the same in the residential areas which are almost entirely overhead distribution.

So far, I have spoken only of things that are perhaps operating, rather than sales, problems.

The sales problems have all been with us, but we believe that they have been definitely mitigated by the fact that for years we have used the district representative system where one man takes care of most company contacts with a group of perhaps a thousand customers, reading meters, servicing appliances, selling, and collecting. I am well aware that there are wide differences of opinion as to the value of this system. Many believe that salesmen should be only that and should have their compensation based directly on their sales. But perhaps because we feel so strongly the importance of community attitude, we believe sincerely in the value of the district representative system.

In 1929, we put it into effect for all residential customers in our territory and despite the fact that we expected it to be the best available sales system, for six months we refused to allow any sales to be made by a district representative. He was to learn his territory, serve his customers to the full and gain their confidence in him as one on whom they could call for advice, help, and the best that service could mean. We know that calls have been made for the most unreasonable things, entirely outside our proper fields but, by them all, real friendship has been developed.

When the representative was allowed to sell, he was told that he must sell only what the customers could properly afford and would use with enduring satisfaction. Any unwise sale would live with him and hurt him for the future. Finally, he had to make his own collections and suffered promptly and directly if he sold unwisely.

The men assigned to this work are of a high type, not youngsters, or dressed up meter readers, and their earnings are sufficient to allow them to have standing in their communities. Base compensation is figured on the routine work of the district with sales commissions, or bonuses, that vary directly with the sales results. In some cases, the men originally chosen did not fit the work or the district to which they were assigned, but the changes have been few and the group, thirty-two in number, have proudly and enthusiastically tried to be true and complete representatives of the company in their districts.

You may wonder if they are as eager to make sales as the straight commission salesman. This actual incident amused and pleased me. One representative had been trying hard to sell an electric range to a customer whose response was that she had no interest in any change. One morning as he started work in his territory, he noticed a gas company salesman drive up to this house and go in. Our man waited quietly until the gas man left, then went into the house with the greeting, "I see you are thinking of some new equipment." The housewife replied that she had made up her mind to buy a new range and had made an appointment with the gas man to go to his store at eleven that morning to pick one out. The representative told her that for her own permanent satisfaction, she must see the electric range first, and be sure that the step taken was the right one. She, largely because our man had proved himself so friendly and helpful in the past, allowed herself to be taken at once to his car and down to our display room. It did not take long to complete the sale and the district representative called the gas man at eleven to say that Mrs. —— would not keep her appointment because she had already bought an electric range.

We have an additional force of five men whom we call specialty salesmen. Each cooperates wth a group of district representatives in closing sales of major appliances.

Finally, the whole group of company employees are taken into our plans and activities and are themselves enthusiastic users and thoroughly sold so that they have continually been a real force for progress.

Even with excellent company personnel, satisfactory results will not come unless those who should be our associates, allies, and aides, that is, wiremen, contractors, and other dealers in electrical merchandise, are real friends and enthusiastic cooperators. I know that I do not need to emphasize this problem to you.

When the market was small, the interest was correspondingly small, but as the market grew, the desire to profit from it grew even more rapidly. Our own company had used most of the early methods to put irons and toasters on our lines, had even given premiums and cut prices. With the increase in interest and activity, we tried to face the situation squarely. The answer for us seemed to be a

definitely functioning organization now known as the Brockton Electric Club. It brought together dealers, jealous of one another and of the utility. It precipitated arguments, complaints, and almost fights, but having brought them into the open and relieved the pressure, it has continued to function with reasonable success. It has adopted policies and sponsored joint activities and most important in our opinion, it has allowed us to know of dissatisfaction before it has become acute. I am sure I do not need to tell you that the moving force and the unofficial guidance in a community as small as ours must come from the utility.

At one time, we suggested to this group that we would withdraw from merchandising all except ranges, refrigerators and water heaters, leaving the rest of the field to them. After a year's trial, they asked us to re-enter the abandoned field, since without the stimulus of our advertising and sales efforts, their own sales results had dropped markedly. For the past five years, we have worked together in the small appliance selling with apparently happy relations, and we definitely consider all appliances worthy of real sales efforts.

In the field of major promotional appliances, we have gone far for the sake of cooperative relations. Dealers have always claimed that the utility has sales advantages that they could not meet. Its men, particularly if of the district representative type, have access to the customer that no salesman of theirs can possibly have. Again, installment selling with payments included with the monthly bill are beyond the reach of any competitor. Finally, terms offered cannot be met by any dealer using finance companies or commercial banks. Our answer has been to give our district representative salesman the same commission on a sale made by a dealer in his territory as on one that he himself makes of company merchandise. We carry dealer paper and collect installments on dealer sales with our regular energy bills, and maintain prices and terms the same as those offered by the dealer.

Following community relations and personnel, one vital factor in any electrical development is a sound rate system and a rate history that shows if not leadership, at least, not a lagging behind popular trends.

In our company the tradition for years has been one of frequent reductions, often small, but made voluntarily and without waiting for agitation to develop. Early in 1926, we were among the first to use a definitely promotional form of residential rate, choosing the area type and incidentally sticking to this type until a few months ago. We believe that we were able to do this without community dissatisfaction because we openly and continually told our customers just what we were trying to do, explained the area charge, not as something theoretically correct, but as a usable means to an end and emphasized repeatedly the value of a promotional form to the customer. Our recent change continues a definitely promotional form, but uses a block instead of area type. From the start the steps chosen allowed cooking at a low rate and today our average return from cooking is slightly over three cents, although much of it is done at two and one-half cents which is without question competitive with other methods and we still believe that it produces an excellent addition to net earnings.

Constantly, we have studied the trends of use as affecting or affected by rates and in particular in the last few years, we have been taking annual samples which we believe to be large enough in extent to give us a true picture of use distribution. This has allowed us to see where changes would affect our market and guide our efforts to the customer groups most susceptible.

Today, our average domestic rate is not quite down to the national average, but for years it has been and is now below our sectional average.

Perhaps I seem to have wandered about too widely and made too many generalizations that may appear to be mere platitudes when I should show specific steps toward the ideal electric home we like to vision. But let me emphasize that my story is only "some progress toward," and not "attainment of" electric homes. Consequently, I believe that there cannot be too much emphasis on the preparation of the soil and the development of the man-power, for these things, rather than high pressure selling or sensational methods are the means of real progress.

Logically, next come tools and specific methods. Here I would like to talk more particularly of cooking, for refrigeration is rapidly taking a position where its development is no longer a problem, where all outlets sell it because the public has learned to demand it. I do not, for a minute, mean to imply that it should be neglected, merely that a continuation of well accepted methods will apparently bring excellent results.

Early ranges were of necessity comparatively expensive. We were fortunate to be able to take advantage of one of the earliest quantity purchases of a standard unit. This allowed us to be one of the very first to offer a complete range installed for under one hundred dollars where before that prices had been nearer one hundred and fifty dollars. With it, in 1931, we made our first big dent in the cooking market. With this stimulation, we started a trial rental plan and, with this for the last two years, have put, and at present are putting, electric ranges in our homes in steadily increasing numbers.

Let me remind you that these homes are those of New England industrial wage earners. Our territory like others has been hard hit and the average weekly wage is below $20. The sales have been made by allowing the home operator to prove personally the satisfaction of electric cooking and discover for herself the small additional cost when added to the electric service that has come to be considered essential under modern standards.

One point in the trial rental set up, we believe to be of real advantage. We give three months' free trial as a trade-in allowance for old equipment. This gets the old equipment out of the way and assures a minimum of three months' trial. During this period, the customer gets real experience with the electric equipment and overcomes any difficulties that may arise from lack of knowledge in its operation. Thorough trained home service representatives work in the individual homes with each customer. If at the end of three months, there is still doubt, the tendency is to keep the appliance, as elsewise it is necessary to get other equipment with an outlay of cash or higher monthly payments.

One present plant will install in the customer's home, without obligation to buy, either a range or water heater, with a monthly trial charge as low as four cents per day, for a range, and seven cents per day for a fifty gallon water heater. If the customer decides to return the appliance, he may do so at any time and simply lose the amount of his monthly trial payments. If during the first twelve months of the trial, he decides to buy a different model electric range, all trial payments are credited on the purchase price of the new range. At the end of sixty-nine months, trial rental payments cease and the appliance becomes the property of the cus-

tomer. A special discount is offered to the customer who converts the trial contract to a sale during the first forty-eight months of the period. Free service is given during the life of the contract. Reverts have been few and there is so great a demand for used ranges that there is usually a waiting list for turn-ins. Something less than half of the ranges put on the lines in the last two years have been installed under the trial rental plan and the tangible result has been to bring our present range saturation to 16.5 per cent.

To you from some sections of the country this figure doubtless seems small and hardly worth noting, but in our territory we consider that it reflects real advance. We know that it and one other closely similar percentage are well ahead of any other section in New England.

All of us know that when we make up our minds to buy, we are eager for immediate possession and use. This is notably so with a housewife choosing a new range, refrigerator or water heater. With this in mind, we put real effort into speeding up the installation and, even though nearly every range sale entails some housewiring, quite regularly we have the range in and ready for use within thirty-six hours after the sale is made.

We have given much thought and effort to water heating and believe that we are beginning to make progress. Two major barriers have been the year round low temperature of our water, and the fact that because of water characteristics, we cannot use galvanized tanks in the territory. After careful study, we decided that with our conditions, the only type of water heating that could be justified economically was off-peak service. We early set up a good off-peak rate and have lowered it until now it starts with one cent energy for the first three hundred kilowatt hours per month and follow on use at eight mills. Particularly, in the last year, we seem to be getting results and now have about 2.5 per cent saturation. More than that the installation, once made, is staying sold and is selling the others. We are interested in the newly formed Council and hope to profit by its activities.

When we face home air conditioning, we very definitely face New England conservatism, or perhaps we might say stubbornness. New England weather has been talked about for years and the consensus of opinion seems to be that the only sure thing about it is its uncertainty. We have no long continued periods of either hot or cold, dry or wet weather. If it is one thing today, you can be quite sure that tomorrow or next day, or certainly the day after, it will be the opposite. Consequently, the New Englander or all but a few exceptional individuals will rather stoically take what comes, grumbling of course, but content to wait for nature to change it. Of those who can afford air conditioning and might be interested, most have summer homes at nearby shore resorts.

Through a few commercial installations and occasional room jobs, we are planting the seed and at every opportunity cultivating the growth. We are optimistic for the future, but are not unduly excited about the immediate prospects.

Lighting activities are perhaps accepted as assured. Really, the work done by the Better Light-Better Sight campaign is remarkable. Homes, stores, offices and factories all have the desire for new and better lighting and it takes continual speeding up of our man-power, not to sell, but to guide and help in the new installations. We have used girls and men with sight meters in the homes and stores, given talks, and demonstrations in the schools and initiated cooperative activites with doctors, optometrists, teacher groups and others.

One recent activity cheered us mightily. We like to plan occasional campaigns that are not confined to the sales department and that offer an opportunity for extra money for all interested employees. With this in mind and aiming very definitely at the small unprofitable user who by a comparatively minor increase could be brought to a profitable status and be ready for real promotional work, we made an excellent purchase of pin-it-up lamps equipped with a 100-watt bulb which, while inexpensive, were merchandise of thoroughly high quality. We told all our employees of them and offered a commission of twenty-five cents for each lamp sold. We made it very clear that no one was to feel any compulsion to sell, but if he enjoyed it here was a real value and an opportunity. The sale was planned to last two weeks and we ordered twenty-five hundred lamps. We sold six thousand with a number of individuals selling over two hundred units. The individual leader was a meter man who sold two hundred and seventy-eight. We considered 600 kw of added lighting worth getting.

Other than this brief mention, I have not spoken of campaigns. We have them repeatedly. They are definitely valuable. They wake all of us up and by the very fact of their limited individual duration, they overcome the procrastination that is a drag on all but the most unusual person.

Special prizes give an added incentive to effort and the mere rivalry of the competition is wholesome.

I am very sure that no campaign of ours has been unique, nor has it incorporated features that you do not already know, and probably use.

If any factor is worthy of mention, it is perhaps the amount to which we try to bring the wives into the activity. In most campaigns, the prices for weekly leaders are usually pairs of theater tickets, and it is amusing to hear the riding that is given to the man who has not taken his wife or girl to a show. The details of the campaign and the general sales aims are carefully told to the wives and it is tradition with us to celebrate a successful winter campaign with a dinner, entertainment, and dance.

We have an able home service department who not only talk, demonstrate, conducts schools for the housewife, for the person gainfully employed in domestic service, for clubs, and social groups, but of vital importance, who also do daily work in the individual home with each new user of an electric appliance.

Newspaper advertising and direct mail material is, of course, in constant use and groups of girl scouts, girl reserves and similar organizations meet in our demonstration rooms and acquire knowledge of, and desire for electric equipment.

Our feeling today is that we are in motion, are on our way, not having attained, but pushing toward the mark. In a three-year period, we have sold 8500 major appliances, or roughly one in every four of our residential customers. They have enabled us to increase our residential use 25 per cent. We have had moments of doubt as to whether we would possibly maintain our pace with our market increasingly sold and with the necessity of working in the lower wage scale brackets. But when we have set ourselves quotas based on what we thought to be cool unemotional judgment, our men have cheerfully broken the quotas and begged for more.

Consequently, our eyes are set on the goal ahead while our thoughts are with the present for we still hold to our be-

(*Continued on page* 307)

Selling

By J. F. Porter, Jr.

Vice-President in Charge of Sales, Kansas City Power and Light Company

An address before the Third General Session of the Fifth Annual Convention of the Edison Electric Institute, Chicago, Illinois, June 2, 1937.

THERE is no doubt that every utility executive has been giving a great deal of time, thought and energy to this problem of Public Relations. And this subject deserves a lot of our consideration, because our business is particularly affected by the relationship between ourselves and our customers.

In most businesses, Public Relations as a problem can be somewhat minimized. People can simply ignore other companies if they feel somewhat at outs with them. But since it is usually impossible fore one of our customers to give part or all of his business to another utility, he feels that he is forced to buy from us whether or not he approves of our company or its policies. If resentment once starts, from whatever cause, it can be disastrously reflected in many ways, and so the matter of Public Relations and public attitude is much more sensitive in our case than it is with other interests.

Now this would be nothing to worry about if all the executives in our companies were able to deal directly and personally with each and every customer, but this, of course, is impossible, and so the relations between ourselves and our customers—and the public in general—are frequently decided by the way the public has been treated by those in subordinate positions in our organizations. And that statement is meant to cover everybody from those immediately below executive rank to the lowest paid of our employees.

For example, did you ever consider, gentlemen, the tremendous percentage of the public who never see any member of your organization except the man who reads their meters? To them that man not only represents your company—he IS your company. And his attitude is accepted and believed in as being the attitude of the company itself.

Therefore, while it is important that we study, think and plan ways and means to improve and protect Public Relations, I believe that as a whole, the success of those plans, however good and well laid they may be, will be determined to a very great degree by the manner in which the other members of our organizations treat our customers.

MR. PORTER

What good does it do us to lay out Public Relationship plans if the individuals who represent us to the public are daily defeating those plans by handling the public in a poor and even an antagonistic manner? Years ago some writer said—"Your actions speak so loud that I cannot hear your words." We need to realize that the actions of our representatives stand to the public as OUR actions. And with that fact in mind, I believe that if we consider the thought just quoted when endeavoring to solve our public relationship problems, we will all agree that it is foolish for us to lay plans for improving Public Relations, if our own actions in dealing with the public run contrary to the policies we want to enforce.

I believe, gentlemen, that every person here will agree that this reasoning is sound—as far as it goes. I believe, too, that those same thoughts have occurred to every man here. So I am not advancing them as anything startlingly new and original, but rather to crystallize our common and united ideas as to what constitutes one vital phase in our problem of Public Relations. And a phase, moreover, that has proved extraordinarily baffling whenever we have had it under consideration.

But while recognition of a problem is a necessary first step toward its solution—and a frank stating of it helps to clarify the issues involved—this particular problem is so greatly and increasingly vital to our industry that it demands our best thought and effort to find a sound and practical solution for it. And, gentlemen, it is of just such a solution that I want to tell you.

Now, the only way, it seems to me, that we can overcome our Public Relations difficulties and at the same time win the public over to a realization that our policies are sound and just, is to make every person in our organizations realize that he has a selling job to do, and that the carrying out of his particular work must be along sales lines.

Like all other organizations, the work necessary to operating our business has to be divided and apportioned. And like other organizations, we indicate individual authority and responsibilities by assigning appropriate titles to different ones. That is all necessary to the smooth operation of our business. But we must remember that, regardless of whether a man has a title or hasn't one, the public views every man in the utility's organization as a representative of the utility, and their attitude toward the company is determined largely by how that man deals with them.

It is exactly the same kind of picture we see every day in the commercial world. You meet a man who, you understand, works for the XYZ Company. He is the only XYZ Company man you know. As you talk with him, he appears indifferent, or conceited, or dumb, or perhaps he gives you an impression that he is tricky. Deep in your mind you form the opinion that the XYZ Company is a callous-minded outfit, or indifferent or selfish or perhaps unscrupulous. And everything you see or hear about that

company is considered in your mind in the light of that prejudice established there by the one man you have met.

If, on the other hand, the man you meet is friendly, alert, thoughtful of your interests, and shows enthusiasm and a high respect for his own company, then your opinion of his company is formed along those lines, and your attitude toward that company will be more friendly, more favorable.

When every individual in our organization realizes that his or her duty is primarily to be a salesman for the utility, they are going to deal with the public in a way that will make friends for the company, instead of leaving those they contact indifferent, or perhaps even resentful or antagonistic. Then, as these people handle every person they contact in a sales-wise manner, it will be a comparatively short time until our Public Relations will improve and many of our present day problems will be solved.

It seems to me, gentlemen, that in approaching this question of Public Relations, it is not a matter of looking for some mysterious method, some magic wand we can wave or some electric button we can push which will solve our problem. It is rather, a matter of internal operation whereby all of us will obtain the sales viewpoint and constantly sell each other and every person we meet on the policies and ideals of our company. Millions of dollars could be spent in endeavoring to wave some type of magic wand to improve our Public Relations, and yet this money would be wasted if we as employees, whether executives or meter readers or what-not, failed to handle customers and the public generally in a diplomatic and sales-wise manner. And viewing this, first of all, as an internal problem, I believe that it must be approached by developing a realization that all of us are salesmen and that we must do a selling job with *every person we talk to.*

Now, let's get clearly in our minds what I mean by a selling job. Certainly it would be foolish for us to try to give a sales talk on our company every time we talk to some individual. That is selling of course, but I am looking at selling from the broader viewpoint of handling people diplomatically. For diplomacy is a real job of selling. The proper handling of complaints is a real job of selling. In fact, every time we make a customer feel that we understand his viewpoint and his thoughts, and show him that we recognize his problem as being our problem too, and do our best to help solve that problem, we do a real job of selling.

Now let's tie these thoughts down so you can get the same clear picture that I have in mind. In doing this we will start with the fundamentals of selling to see if we actually do convey our thoughts in a clear and easy-to-understand manner. You see, we all know so much about the public utility business, we often forget that our listener lacks the education we have gained in that line. So when we talk to him about our business or our service, or the appliances we sell, we often express ourselves in such a manner that it is hard for him to get the same viewpoint we have.

Now to prove to you how easy it is to confuse the listener's mind, I am going to give you what I believe is the usual talk on an electric refrigerator.

Now I am going to make this demonstration very brief. In fact I am going to ask you to imagine that I have already had some conversation with the prospect and am now ready to demonstrate this refrigerator. From watching many demonstrations, I have found they run about like this—

"Madam, you will notice that the exterior of this refrigerator is a fine porcelain enamel—(Now open door)—and that on the inside of this door is a continuous rubber gasket all around the door—the inside of this refrigerator is also porcelain enamel and every shelf is twice dipped in a zinc bath. This refrigerator is scientifically insulated and it has the highest quality refrigerating unit known—"

Well, gentlemen, that is about how the usual sales talk runs on a refrigerator. I was able to give you a lot of information just by means of those few statements, but I wonder if the prospect, who knows less about such things, would be as much impressed as you are. What does "a continuous rubber gasket on the door" mean to him? What does he care whether "the shelves have a double dipped coating?"

All it means to him is that this refrigerator has certain gadgets on it that might as well be on a sign post in "Timbuctoo" as far as he is concerned. It all leaves the prospect somewhat confused in mind, because while they do tell something of how the refrigerator was built, few prospects would be able to see why such construction means anything to them. And, gentlemen, the only reason a prospect or anybody else parts with money is with the expectation of gaining certain definite Benefits, and unless they see Benefits far greater than price, they will refuse to purchase.

Now in that brief talk, I didn't tell you of one solitary Benefit the purchaser of a refrigerator would enjoy. Is it any wonder that a prospect who hears such a talk and then heard the price of the refrigerator, would think the price too high? When a prospect fails to hear sufficient Benefits, he *always* raises the question of price, but when he realizes how he is going to gain or Benefit, and realizes that these gains or Benefits are worth more to him than the money asked, he buys gladly.

Now the only reason that the refrigerator has those features is because they make it possible for the User to enjoy certain definite and desirable Benefits. And he buys because he becomes *convinced* that he *will* enjoy them.

Now I am going to make another brief sales talk on this refrigerator—and notice the difference in the way it appeals to you, compared with the former one.

"Madam, you will find this refrigerator is very easy to keep clean, and it always beautifies the appearance of your kitchen, too, because of this fine porcelain enamel exterior. It will actually give you a lifetime of labor-saving, trouble-free service.

"Here is another thing you will like, Madam. When you open the door, you will notice that you can easily see into every nook and corner of that refrigerator. Think of how easy it will be for you to locate and take out the food you want, and how much more food you can store in the refrigerator because you can pack it better. This concealed light here does it. It flashes on when you open the door and flashes off automatically when you close it. It will save you many spoiled containers of food and make your kitchen work so much easier. Another thing, you can be sure, too, that all of your foods will be perfectly preserved for long periods of time and that you will be saved much food spoilage because of this continuous rubber gasket that goes all around the door and makes it fit tightly. That keeps the cold inside the refrigerator where it belongs and helps reduce your refrigerating cost, too . . . ."

Now to make clear what I am getting at with those two brief sales talks and how they tie in our problem of Public Relations and meeting that problem from within our own organizations.

A salesman can make the first of those talks without any particular thought. He can just stand and look at the refrigerator and say the things that happen to come into his mind. And you heard the kind of talk that comes from following that method. But to give the second talk, the one that would really influence a prospect toward buying, he must have given the matter some thought, and most of all, he must have definite ideas and have them definitely organized in his mind. It is not enough

for him to know those thoughts, he must also know how to organize them so he can speak them effectively.

Now in exactly the same way it is necessary for the man who is to talk effectively about our company and its policies, service or the merchandise we sell, to have his ideas organized so that they will have the fullest effect on the mind of the one to whom he is talking. That rule holds as true in selling an idea or a plan or a service inside or outside our offices as it does in selling merchandise to prospects.

The man who fails to satisfy others that they will Benefit by buying, will fail to sell many whom he could sell if he had his ideas organized, for people seldom think of Benefits by themselves. They have to be told about them. It is not safe to leave them to infer Benefits.

In the same way we hurt our own Public Relations when we leave people to infer things about our Company and our business that we want them to know. The only way we can make sure of not leaving such things to inference is by thinking sales-wise and so having our thoughts and ideas arranged and organized just as a salesman must do to be successful.

Gentlemen, we lose good will and our public relations suffer when people refuse to buy from us and walk out of our showrooms. But we improve our Public Relations when our customers are made to see the Benefits they will receive from our services and the appliances we sell, and buy them willingly and gladly.

But don't let me give you the impression that all this applies only to those people who actually sell appliances. Let's look into another phase of our operation by considering the meter reader. I want to show you an actual case that happened just sixty days ago to a friend of mine. This man was leaving his home for three months, and just before he left a meter reader came to read the meter.

To give you a perfect picture of what happened, I am going to pretend that I am this friend of mine, and this platform is my home. My bags are all packed and I am ready to leave town, when the meter reader enters. He makes his reading, posts the figures in his book.

(Meter reader enters in costume, goes through motions of reading meter and posting the figures in his book and then starts to leave)

FRIEND: "Well, you are not going to be bothered with me for the next three months. I am going to be out of town."

METER READER: "I don't care. It is all the same to me."

FRIEND: "What do you mean you don't care? Aren't you interested in whether or not I consume electricity?"

METER READER: "Nope—means nothing to me. I just make my rounds and I don't care whether you buy electricity or not."

FRIEND: "Well, aren't you interested in knowing that your company is going to have no revenue from me for three months and that they won't sell me any electricity?"

METER READER: "Say, I don't worry about the Company. They'll get theirs. That's why they've got the minimum bill idea worked out, so they can get money out of you whether you use electricity or not."

FRIEND: "Just a minute, my man. Let me tell you something. The only reason your company has a minimum bill charge is so they can keep men like you on the payroll. Where would you be if you lost your job—where would you get another one? Do you actually feel that your company has this minimum bill charge just so they can sting people and take in a lot of cash? If you do, then you certainly don't know the policies of your company, and I would suggest that you find out about things like this. Because you should be taught to work for your utility and realize that they are giving a mighty important service to the public at a very low rate. Think it over because I believe that right now you are doing more harm to the company and to your own job than the cheapest politician in the country."

METER READER: "Well, I never thought of that. Maybe there's something to it. Thanks, Mister."

(Meter Reader touches his hat and leaves)

(Act closes)

Now, gentlemen, that is an authentic case. And while it may seem somewhat extreme to you, I believe we all realize that things like this are going on daily—but we don't always have a good friend to educate our men for us.

To overcome these and similar troubles, I believe that we must so educate our people that they realize they are a part of the Company, and likewise educate them—in schools if you will—whereby they understand the benefits of our policies, our operations.

When every representative of a utility is salesminded, is able to talk as a salesman for us, our Public Relations are bound to improve. In fact, they will improve so rapidly that we will come to consider them a minor problem.

That is why I feel the matter of Public Relations is mainly an internal problem, and that when you executives lay plans for improving your Public Relations, one of your first steps should be the making of salesmen out of each and every employee.

A corporation may spread itself over the whole world and may employ a hundred thousand men, but the average person will usually form his judgment of it through his talk with one individual. If this person is rude or inefficient, it will take a lot of kindness and efficiency to overcome the bad impression. Every member of the organization who in any way comes in contact with the public is a salesman, and the impression he makes is an advertisement, good or bad.

Public Relationship is merely the result of the impression our customers get of us. Therefore, gentlemen, I believe you will agree with me that it is advisable that we first educate ourselves so that we can create the proper type of impression.

Some Engineering Contributions

(*Continued from page* 286)

interesting. We must look upon the overall results as a joint accomplishment. The design of the complete power systems and the operation of these systems to give the public good and reliable service is one of the accomplishments of the engineers of the Electric Service Companies, and the manufacturers could do little in the way of the development of improved and superior equipment without the encouragement, assistance and full cooperation of the engineers of the Electric Light and Power Companies. Furthermore, it was only through the encouragement, vision, and management of the Electric Service Companies, combined with their sales and exploitation efforts, that the public of this country today has been able to enjoy a superior and more extensive electric service than that enjoyed in any other country.

The result of all this is shown in Figure 15 which indicates how the Electric Light and Power Companies have taken advantage of these engineering achievements in power generation and transmission and distribution, and have passed them along to the user in the way of lower and lower rates so that the average rate to the domestic consumer today is but little more than one-half of what it was in 1916. The consumer has taken advantage of the lower rates and new and improved lamps and devices, and has increased the average domestic use from 260 kwhr per year to 709 kwhr per year, or more than double. And the service has improved as to reliability, continuity and constancy of voltage. And what does the consumer pay for this service? If he uses the average 709 kwhr per year and pays the aver-

(*Continued on page* 304)

Report of the Prize Awards Committee

By Frank W. Smith

Chairman, Prize Awards Committee, Edison Electric Institute

Presented at the Fifth General Session of the Fifth Annual Convention of the Edison Electric Institute, June 4, 1937

IN addition to administering the *Charles A. Coffin Award,* the Edison Electric Institute has had the privilege of being the sponsor for seven prize awards during the past year, which have been established by the donors to encourage and promote progress in the electric light and power industry. These awards are divided into two classes.

The first group comprises those in recognition of outstanding accomplishments by companies in specified activities. They are the *George A. Hughes Award* for the greatest contribution to the development of the domestic electric cookery load, the *Augustus D. Curtis Award* for the greatest contribution to the advancement of artificial illumination of commercial and public buildings, and the *Thomas W. Martin Award* for accomplishments in rural electrification. The second group includes prizes to individuals for essays on subjects relating to the electric light and power industry, embracing the *H. M. Byllesby Prizes, B. C. Forbes Prize, A. L. Lindemann Prizes,* and the *James H. McGraw Prizes.*

The Committee is gratified to report that 232 papers and exhibits were submitted by employees of 95 companies in 40 states and Canada in the competition for the several prizes. These papers have been on display during the convention and it is hoped that many of the delegates have had the opportunity to examine them and that the display of the presentations would create further interest in the awards, particularly on the part of the Executives in encouraging their employees to enter contests for next year's prizes. These papers, like those submitted in previous years, will be on file at the Institute Headquarters, in New York, where they may be examined, and they will be loaned to member company representatives upon request. Many requests were received at headquarters during the year from both companies and individuals for the papers and exhibits entered in last year's contests. The valuable contributions brought forth through these contests

MR. SMITH

will be reproduced in the Institute *Bulletin,* from time to time.

The presentations have been reviewed and evaluated, and the winners selected by a separate group of three judges for each award, each of the judges being an outstanding representative in the respective fields of the awards. The Institute and your Committee are greatly indebted to these ladies and gentlemen who so willingly performed this very laborious task.

It is with pleasure that the Committee announces the results of the contests. The donors of these prizes or their representative have very kindly consented to be on the platform to award the prizes to the winners. Will each winner, as his name is called, please come to the platform.

The Augustus D. Curtis Award

A certificate donated by Messrs. Darwin Curtis and Kenneth Curtis, of Curtis Lighting, Incorporated, in memory of Augustus D. Curtis, to the public utility operating company within the United States which, during the twelve-month period ending March 1, 1937, has shown the greatest contribution to the advancement of Artificial Illumination of interiors or exteriors of Commercial and Public Buildings, and a cash prize of $300 to the individual or individuals in that company responsible for the achievement. A second prize of $200 and a third prize of $100 to the individual or individuals responsible for the achievement of the companies adjudged second and third in the contest.

There were 11 presentations submitted in competition for the Curtis Award. The judges for the award were Mr. Ely Jacques Kahn, Mr. Howard Myers and Mr. G. Bertram Regar.

The first prize is awarded to New Orleans Public Service, Incorporated, New Orleans, Louisiana, for a highly commendable sales and promotional plan which not only was centered on the larger customer who demanded expert engineering service, and for whom lighting improvement brought sizable increase in connected load, but particularly for consideration of a much larger group in numbers, the small commercial customer.

Through intensive sales effort, lighting was improved in thousands of small commercial establishments and results were productive in the standard of service rendered to the consumer, and the company was rewarded with a justified increase in revenue. The exhibit submitted was impressive of selective selling.

This is the second time this company has distinguished itself in the field of commercial lighting, having won the Curtis Award in 1931.

Mr. A. B. Paterson, President of New Orleans Public Service Incorporated, is here to receive the award of the Certificate on behalf of his organization. Mr. C. S. Green, of the Sales Promotion Division of New Orleans Public Service Incorporated, receives the cash prize of $300 which is awarded to the individual responsible for the achievement.

Honorable Mention was awarded to the Ohio Public Service Company, Cleveland, Ohio, for an excellent lighting sales program, outstanding in which was a carefully planned and effectively

executed activity for the relighting of public schools.

The second cash prize of $200 to the individual responsible for the achievement goes to Mr. Robert W. Butts, Commercial Representative of the Sandusky Division of that Company.

Honorable Mention was also awarded to the Commonwealth Edison Company, Chicago, Illinois, for outstanding achievement in developing a sustained, well-balanced program of advertising, promotion, sales stimulation, and stimulation of sales people which brought productive results in added load and revenue, and is setting a standard of improved illumination in all commercial establishments.

Mr. Oliver R. Hogue, of that Company, is awarded the third cash prize of $100 as the person responsible for the accomplishment.

The George A Hughes Award

A trophy donated by Mr. George A. Hughes, President, Edison General Electric Appliance Company, Inc., to the public utility operating company within the United States which, during the year 1936, has shown the greatest contribution to the development of the Domestic Electric Cookery Load through promotion, or selling, or both, and cash prizes totaling $1,000 to the individuals responsible for the achievement.

Under the terms and conditions of this award, the cash award of $1,000 is to be divided as follows:

$500 is awarded to the commercial or merchandising executive responsible for the achievement, and $500 to be divided among the retail sales directors and retail salesmen by the commercial or merchandising executive, in proportion to the extent they have contributed to the company's activity in the promotion of the electric range.

The award further provides that where a company is not engaged in the actual merchandising of electric ranges, the second $500 may be distributed at the discretion of the commercial executive either to members of his department working with outside agencies or to the agencies themselves.

The judges of this award were Mr. Shelley Tracy, Mr. L. E. Moffatt and Dr. Hugh E. Agnew. There were 10 presentations submitted in the contest.

One of the judges of the Hughes Award who has served in this capacity for the past two years advised that it has become increasingly difficult to pick a winner. The terms of the award give major weight to the greatest percentage of ranges sold to non-users during the contest period, but the comprehensiveness of promotional plans is sometimes striking in companies with lower averages. Excellence of these plans must be balanced with actual sales results. The judges have made specific recommendations in relation to these points.

It gives me pleasure to announce that the Utah Power & Light Company, Salt Lake City, Utah, is the winner of the George A. Hughes Award.

This Company has put into effect a broad sales and promotional program which gave full consideration to dealer cooperation, and also tied-in with local housing activities. Successful sales results were achieved in a strongly competitive market with cheap competitive fuels, and without any unusual inducements to encourage purchase on the part of the consumer.

Mr. P. M. Parry, Vice President in Charge of Commercial Activities of the Utah Power & Light Company, is here to receive the trophy in behalf of his organization, and also the cash prize of $1,000 to the individuals responsible for the achievement, to be distributed by him within the terms of the award.

The judges conferred Honorable Mention on Niagara Electric Service Corporation, Niagara Falls, New York, and New York & Queens Electric Light & Power Company, Long Island City, New York.

The Thomas W Martin Award

A bronze plaque donated by Mr. Thomas W. Martin, President, Alabama Power Company, to the public utility operating company within the United States which, during the year 1936, has shown the greatest contribution to the advancement of Rural Electrification.

The judges for this award were Mr. Philip S. Rose, Mr. T. K. Quinn and Dr. E. A. White.

As electric light and power companies are forging ahead and making new records in rural electrical development, it is pleasing to find renewed interest in the entries for the Thomas W. Martin Rural Electrification Award. The exhibits submitted this year showed excellent accomplishments and this, together with the fact that the companies submitting exhibits were operating in different classes of territory, made the judging of this award a difficult task.

The judges determined as the winner Niagara, Lockport & Ontario Power Company, Buffalo, New York, for its comprehensive plan for rural load development, its extension of rural lines and general agricultural advancement within the company's territory due to the uses of electricity.

The judges have given Honorable Mention to Alabama Power Company, Birmingham, Alabama, winner of the award in 1932, and also Louisiana Power & Light Company, New Orleans, Louisiana.

The H. M. Byllesby Prizes

Three cash prizes—one of $100, one of $50 and one of $25, donated by the Public Utility Engineering and Service Corporation, in memory of Colonel H. M. Byllesby, for the three most meritorious papers on any Accounting subject relating to the Electric Light and Power Industry.

The judges for this award were Dean John T. Madden, Mr. B. F. Braheney and Mr. W. Paxton Little.

First prize has been awarded to Mr. H. O. Hussong of the California Oregon Power Company, Medford, Oregon, for his paper entitled, "Reasons for a Retirements Reserve."

Second prize goes to Messrs. L. M. LaPorte and E. M. Wagner of the Milwaukee Electric Railway & Light Company, Milwaukee, Wisconsin, joint authors of a paper entitled, "Meter Reading Work a Function of Customers' Accounting."

Third prize goes to Mr. Neil E. Heikes of the Public Service Company of Northern Illinois, Chicago, Illinois, for his paper entitled, "The Problem of Debt Discount and Expense in Connection with Public Utility Bond Issues."

Honorable Mention is awarded to:

Mr. Joseph E. A. Ross of the Consolidated Edison Company of New York, Inc., and Mr. Harold G. Creamer of the Public Service Co. of Northern Ill., Chicago.

The B. C. Forbes Prize

A cash award of $250 donated by Mr. B. C. Forbes, Editor, Forbes Magazine, for the most meritorious paper dealing with the subject of Public Relations in the Electric Light and Power Industry.

There were 116 papers submitted in competition for this prize. The outstanding quality and merit of a number of the papers submitted made the awarding of this prize truly difficult. The judges, Mr. J. F. Owens, Mr. Britton I. Budd and Mr. D. C. Green, after careful consideration awarded the prize to Mr. Clarence M. Kilian of the Alabama Power Company, Birmingham, Alabama, for his paper entitled,

"Public Relations—Lip Service Only?"

The judges deemed it fitting to award Honorable Mention to:

Mr. E. R. Eberle of the Public Service Electric & Gas Company, Newark, N. J.

Messrs. L. M. LaPorte and E. M. Wagner of the Milwaukee Electric Railway & Light Company, Milwaukee, Wisconsin, as co-authors of a paper.

Messrs F. J. Porter and J. E. King of the New York & Queens Electric Light & Power Company, New York, as co-authors of a paper.

Mr. Henry H. Carpenter of the Blackstone Valley Gas & Electric Company, Woonsocket, Rhode Island.

The judges in notifying me of their decision, stated that, "In the main, the one hundred and sixteen papers submitted reflect intense thought and wide interest on the part of employees in this all important question of what the public think of us as being paramount. Each of the one hundred and sixteen papers is unusual."

The A. L. Lindemann Prizes

Three cash prizes—one of $150, one of $100 and one of $50 donated by Mr. A. L. Lindemann, President, A. J. Lindemann and Hoverson Company for the three most meritorious papers dealing with the Advantages of Electric Cookery for Domestic Purposes.

The judges for this award were Mr. Earl Whitehorne, Miss Mildred A. Nichols and Miss Ada Bessie Swann.

First prize was won by Mr. Paul L. Meyers of the Florida Power & Light Company, Bradenton, Florida, for his paper entitled, "Food Fit for a King."

Second prize was won by Mr. R. L. Greene of the Detroit Edison Company, Detroit, Michigan, for his paper entitled, "Coronation: Electric Cooking Comes of Age."

Third prize was won by Mr. George E. Kelley of the Portland General Electric Company, Portland, Oregon, for his paper entitled, "Advantages of Electric Cookery for Domestic Purposes."

The James H. McGraw Prizes

Three cash prizes—one of $250, one of $150 and one of $100 donated by Mr. James H. McGraw, Honorary Chairman, McGraw - Hill Publishing Company, for the three most meritorious papers on any Engineering or Technical subject relating to the Electric Light and Power Industry.

The judges for this award were Mr. John C. Parker, Mr. J. T. Barron and Mr. W. I. Slichter.

First prize was awarded to Mr. J. M. Mousson of the Safe Harbor Water Power Corporation, Baltimore, Maryland, for his paper entitled, "Practical Aspects of Cavitation and Pitting."

Second prize was awarded to Mr. Wallace C. Rudd of the Consolidated Edison Company of New York Inc., for his paper entitled, "A New Method for Checking Instrument Transformer Connections to Watthour Meters." Mr. Rudd was the winner of the Third James H. McGraw Prize last year.

Third prize was awarded to Mr. Anson D. Marston of the Kansas City Power & Light Company, Kansas City, Missouri, for his paper entitled, "Energy Consumption by Air Conditioning Customers."

Edison Electric Institute Medal

I wish to take this opportunity to report on the Edison Electric Institute Medal. This medal is awarded in recognition of the successful resuscitation of individuals suffering from electric shock, and to maintain and encourage interest in the training of employees in the use of the Schafer Prone Pressure Method of Resuscitation of the saving of life.

There have been 18 Institute medals awarded to employees of member companies for saving of life since the announcement made at last year's convention. Since the inception of the award in January, 1933, there have been a total of 56 medals awarded.

These medals were presented by the managing or other responsible executive of the recipient's company at group meetings, safety rallies and other large gatherings of employees and their friends.

The plan is administered by a Committee of Judges comprising Mr. E. W. Gorry, Chairman, Mr. C. R. Beardsley, Mr. Wills Maclachlan and Miss M. B. Woods, Secretary. This Committee has served since 1933 and I express to them my sincere appreciation for valuable service they have rendered.

R. B. Marshall Award

In behalf of the Prize Awards Committee, I take great pleasure in announcing the establishment of a new award to be known as the R. B. Marshall Award, offered through the courtesy of Mr. R. B. Marshall, President of Electromaster, Inc.

The award provides for five prizes of $100 each for individual sales achievement in electric range sales over a twelve months' period. The details of this award will be announced at a later date.

Finally, the Committee desires to express its appreciation to the donors or their representatives for their presence here; to the company executives for their attendance to receive the awards on behalf of their company; and to thank the executives of those companies who found it possible to arrange for the attendance here of the individual winners of the prizes.

The Committee is particularly grateful to the donors for their generosity in offering these awards.

I cannot close without a word of appreciation to the members of the Institute Staff who have rendered such splendid cooperation and assistance to me during the seven years I have had the honor of being Chairman of the Prize Awards Committee.

I am deeply grateful to Mr. Weadock, Major Bennion, Miss Woods and Messrs. Greenwood and Maxwell, the Colemans, Wilgar and J. O'R. and Mr. Rainey and express to them my sincere thanks.

On behalf of the Prize Awards Committee, and I would like to say here that the other members are Mr. Charles W. Kellogg, your President, Mr. James E. Davidson, and Mr. M. T. Chandler, Secretary, I congratulate the winners of this year's prizes, and thank you very much for your attention.

Some Engineering Contributions

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age rate, he pays just one week's workman's average pay. What else can he purchase that does so much for him—a whole year's electric service for one week's pay? In what other country can the average citizen enjoy electric service for the equivalent of a week's work? Similarly, he can buy an electric refrigerator for one month's pay, while the working man in Europe must work three months or more to buy an electric refrigerator.

The impression I wish you to carry with you then is that our Research and Engineering objective is to obtain more and more electrical power from each unit of fuel, to lose less and less of the electrical power in distributing it to the user, and to have each unit of electric power do more and more for the user, all to the end that we obtain the maximum benefits from our natural resources to the best social and economic interest of the nation.

Commercial News Notes

By C. E. Greenwood

Commercial Director, Edison Electric Institute

THE most successful Convention under the banner of the Edison Electric Institute has marked the beginning of another administrative year. President C. W. Kellogg has appointed D. M. DeBard to guide again this year the energetic and fruitful activities of the Sales Committee. Such reorganization in committee structures that is essential is nearing completion, and committee chairmen, all of whom have been re-appointed, are advancing their scheduled activities.

The watchword is more sales plans and more information to contribute to commercial progress. The Commercial Executive has many demands on his time beyond the business-getting factor. There is opportunity for our committees to be of immeasurable service to commercial men and all business-getting interests in the industry under the circumstances.

In these days advertising and promotion of electrical service are not only in competition with the marketing activities of other industries, but in gaining attention we are in competition with labor strife, major political activities and striking news from a score of sources.

We need organized effort to combat the appeal of other industries. Our committees are alive to the situation.

At the half-way mark for 1937 sales of electric household equipment continue upward. Refrigerators, ranges, water heaters, home laundry equipment, vacuum cleaners and a long list of smaller appliances are showing substantial gains in unit volume. There appears to be no diminishing in volume for the balance of the year. We are confident that in mass effort the selling curve will continue upward.

Financing Equipment

An important factor in the selling of electrical equipment is the terms of financing. There have been wide variations in viewpoint within the industry and in banking circles on the economic soundness of terms offered in connection with the selling of household equipment. At one time the utilities were challenged as the offenders in the field of long-term contracts. But later the establishment of EHFA followed by the extended terms of FHA for household equipment, pointed out that utility terms generally had been comparatively conservative.

We have been progressing with terms varying from 24 to 48 months and it is therefore of particular interest that we find the Credit Division of the National Retail Dry Goods Association taking action in a recent meeting with a Resolution which recommends 24 months as a maximum for contracts covering electrical equipment. Other trade groups have been thinking along similar lines. Electrical manufacturers are more favorable to a 30-month limit with a minimum 10 per cent down payment. Although no published data on losses seem to be available which would justify waving the flag of caution at this time it appears wise to be watchful of these trends.

Report on Financing Equipment

In the light of expressed interest on the subject of financing from different sources, the publication of the Report of the Institute's Committee on the Financing of Equipment is opportune and will be most helpful. The Committee states in its report that it has avoided any attempt to discuss controversial matters or arrive at conclusions. A factual presentation of experience data of a large number of utility companies is submitted for the information and guidance of our membership. Data are assembled in a convenient form and the Report will serve as a valuable reference for those having the subject of financing equipment under advisement. Chairman Harold and his Committee have completed in painstaking manner a creditable job.

Commercial Sales

There has been prepared by the Commercial Sales Committee under P. M. Alden a Directory of Manufacturers of Commercial Equipment Using Electricity which is without doubt the most complete available. Such information for ready reference will be of obvious assistance to salesmen for the commercial classifications of business. Each member company will receive a copy on or about August 1. Additional copies may be obtained at 50c each for members and at $1.00 each for non-members.

Commercial Electric Cooking Council

The success of cooperative national promotion with manufacturers, even in the more modest Programs has been effectively demonstrated. Now comes the Commercial Electric Cooking Council organized in conjunction with the Food Service Equipment Division of NEMA. The objective is to stimulate broader interest in the promotion and sale of commercial cooking equipment especially of the counter and pantry variety.

P. M. Alden will serve as Chairman of the Council. It will be operated along the same lines as the Running Water Program of the Electric Water Systems Council. A plan is now in preparation, and it is anticipated that announcement of complete organization and a Plan Book will be available in early September.

Handbook of Interior Wiring Design

Completely sold out! That is the situation at the present time as the fourth edition of the *Handbook of Interior Wiring Design* is exhausted. The thirst for knowledge relative to the latest developments in wiring practice for buildings of all classes contained in the *Handbook* has not yet been satisfied with the 31,000 copies distributed.

This is recognized as the most authoritative treatise which can be obtained and arrangements are now being made for the fifth edition. All companies requiring additional copies should send orders in early in order to have their requirements met in the next available supply.

Lighting Sales

As financial reports are published in the mercantile field showing increased sales and profits for merchandisers, we realize that now is the opportune time for the merchant to act upon that relighting of the store which he has planned for so long. The direct relationship of correct and adequate lighting in the field of merchandising, and the measurement in return of greater sales, make store lighting a profit builder for both the merchant and the utility. "Light for selling" in the store can be made as productive as "light for seeing"

in the home. "Light for selling" in the store is a slogan with potential powers for productive results.

Our Lighting Sales Committee under M. N. Waterman has published its Plan Book under the caption *Plan for Profit Program* which is intended to encourage a nation-wide drive on those retailers who have not yet sensed the Profit value to themselves of a well-lighted store.

Kitchen Modernizing Bureau

A complete report covering the past year's activity in Kitchen Modenizing has been issued to all contributing manufacturers and to Regional Directors. It is an interesting story of accomplishment by the Bureau under the direction of Chairman George E. Whitwell and his assisting staff. New fields have been plowed, and other local entries that have been actively tying-in since the start of the Program are extending their local activity. This is not a movement for the electrical industry only. It is one in which we must depend on stimulating active interest of the architect and builder, the real estate operator and the banker or insurance company that wants to modernize property for selling.

Outstanding in the more recent local entries for cooperative promotion are the states of Minnesota and the Dakotas which have been organized under the Associated North Central Electrical Industries, and inspired by Regional Director H. E. Young, and also the extensive activity in the Carolinas under Regional Director S. P. Vecker. In the latter program the special plan book entitled *Green Lights Ahead* describes the activity to electric dealers as "the best and most promising in which they have been invited to participate."

Reports of the field force—Dr. Allison, B. F. Weadock, Jr., and F. H. Harrigan—are enthusiastically prophetic of the build-up and the possibility of sales results through progressive action under the Kitchen Modernizing banner. What has been most gratifying to the Bureau members and to all those who have participated are the remarkable sales results of the individual items of kitchen equipment that the electric kitchen "approach" has been able to produce under organized effort. The edition of 200,000 copies of the booklet *Meals Go Modern Electrically* is practically exhausted and a reprint is now under advisement. There has been highly satisfactory use of the display material furnished by the Bureau, publicity is remarkably extensive in all classes of media, and electric kitchens have been featured in hundreds of exhibits.

It is not surprising that Philadelphia, the home town of the Chairman of the Bureau, should be the first to carry through an Electric Kitchen Show. Its success has resulted in the purpose of the local League management to make this an annual affair to replace the former annual refrigeration show.

There have now been established locally approximately 140 Electric Kitchen Bureaus in various classifications which in itself is convincing of the opportunity for cooperative load building.

The Plan Committee met at Institute Headquarters on July 19 and has outlined plans for expansion of the Program to be presented at the next Executive Committee meeting of the Bureau.

Electric Water Heating Program

Closely allied to, and tied-in with the modernizing of the kitchen, is the specialized activity of the Electric Water Heating Committee under the Chairmanship of K. M. Robinson. Every utility has received the Plan Book announcing the complete 1937 Program on water heating under the caption *Building Revenue With Electric Water Heaters.* Again the manufacturers of water heaters in NEMA join with the Institute in stimulating new interest in obtaining this profitable business. There is public interest in domestic hot water supply. The number of companies offering a water heating rate has been steadily growing. There is no reason why we should not popularize electricity as the ideal fuel for water heating as we are doing in connection with electricity as a fuel for all cooking purposes.

There is a convincing message for the public. It is dramatically presented in the Plan Book, and any commercial man in charge of water heating sales who has not received his copy should write for it. The outstanding promotional feature for 1937 is the Award offered by the National Electric Water Heating Council of a trophy and $1,000.00 in cash to the operating utility and individuals in the company whose effort shows greatest contribution to the development of the domestic water heating load.

Thirty-eight utility companies in all sections of the country have registered in the contest. This represents approximately 30 per cent of the 120 utility companies that are offering a rate for electric water heating of 1¼c or less.

RECENT E.E.I. PUBLICATION

A-C NETWORK OPERATION—1934-35

E.E.I. Pub. E-8. A report of the Transmission and Distribution Committee, Edison Electric Institute, 42 pages. Price 70¢ to members and their employees; $1.60 to nonmembers in the U.S.A.; $1.75 to foreign countries.

The total peak load served by low voltage A-C networks in 1935 showed an increase of 20.5 per cent over that reported for 1933. The increase in capacity to supply this additional load showed an increase of 17.35 per cent for the same period resulting in an improvement in the load-transformer capacity ratio.

A greater number of network areas are being designed and operated with a smaller permissible voltage range than has been used in previous years. 27.8 per cent of the total number of networks are operated with a permissible voltage range of plus or minus 1.5 per cent to 2.5 per cent. Approximately 76 per cent of all networks are confined to a maximum voltage regulation of 3.5 per cent plus or minus.

The performance of network protectors under conditions requiring the clearing of defective primary equipment at the secondary side of the network transformer is considerably poorer than that experienced in previous years.

The performance of primary voltage feeder cables supplying low voltage A-C networks is materially improved, the failure rate falling from 7.65 failures per 100 miles of cable in service in 1933 to 5.05 failures per 100 miles of cable in service in 1935.

Network transformers show improvement in performance. The number of failures per year per 100 equivalent three-phase banks dropping from 0.89 in 1933 to 0.075 in 1935. 88.3 per cent of the total transformer failures in the 1934-1935 period occurred on primary voltage equipment, while 5.9 per cent occurred in the secondary winding or terminals.

Data in this report indicate a relationship between the frequency of inspections and the performance of network protectors and transformers. Increasing the inspection interval from one year to two years increases the failure rate of transformers from 0.6 to 1.04 failures per 100 banks per year. The rate of failure of network protectors to operate shows a similar relationship to inspection frequency. Increasing the inspection in-

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Better Light-Better Sight Slogan is Familiar to Half of Population, "Inquiring Reporter" Discovers

INTERVIEWS with eight hundred persons in eight cities and towns throughout the country were summarized at the Chicago convention of the Edison Electric Institute, and answered any questions that that group might have had about the success of Better Light-Better Sight movement as an industry program. Bonded reporters from an independent survey organization, questioning fifty men and fifty women at random in each town, found that 46 per cent of those questioned recognized the Better Light-Better Sight slogan, and 25 per cent had a very fair understanding of its meaning.

The plan for a survey of this kind was first tried out in Buffalo, where the local electric company wished to determine the effectiveness of its efforts. The "Inquiring Reporter" was called in, and a tabulation of the answers showed that 65 per cent of those interviewed had heard the slogan and 58 per cent understood it.

For the sake of comparison, the reporter then went to Akron, N. Y., a town of approximately 2,000 people. Here the utility had made no special promotional effort, and the percentage of persons knowing the slogan dropped to twenty-nine, and only 4 per cent had even a fair idea of what it was about.

The differences between the Buffalo and Akron results might, however, have been attributed to the difference in the size of the community, so as a check the reporter visited Cuba, N. Y. Cuba is about the same size as Akron, but the local utility company had carried on Better Light-Better Sight promotion. Forty-four per cent recognized the slogan and 28 per cent knew what it means.

When the record of these three surveys was made known the executive committee of the National Better Light-Better Sight Bureau decided to select several typical cities in other parts of the country, in an attempt to get a national cross-section. The cities selected were: Portland, Ore.; Chattanooga, Tenn.; Milwaukee, Wis., and San Antonio, Tex. In Portland, 45 per cent knew of the slogan and 24 per cent understood it; in Chattanooga, the figures were 44 per cent and 27 per cent; in Milwaukee 40 per cent and 22 per cent. In San Antonio the figures rose to 63 per cent and 37 per cent, respectively.

The survey was completed by interviews at Jamestown, N. Y., where the electric plant is municipally owned. Here only 32 per cent recognized the slogan, and not more than 4 per cent had any idea of its meaning.

In six communities where there had been local promotional effort, an average of slightly more than 50 per cent of those interviewed were familiar with the slogan, and slightly less than 33 per cent understood it. In two communities where no effort had been made, the corresponding averages were 31 per cent and 4 per cent!

Statistically speaking, the number of interviews in the survey is too small to permit absolutely certain conclusions, but these differences are far too large to be attributed to chance.

What Women Can Do

(*Continued from page* 279)

feels has had some training in the field.

We have a better opportunity to get into the homes. For example, very few of our girls make a front-door entrance. We use the rear door, because in the morning hours, that is where the woman is, out in the kitchen doing her work. A salesman can't do that. If her home is not in order, she won't let him in at all. She doesn't object to letting a girl in, because she knows the girl will understand her predicament, so a girl rarely has a refusal. I think we have never been refused at a home in the three years of our operation, where it has been serious.

Girls can get business which is normally unprofitable for salesmen, for example, the low use customers, and we are specializing on them in this campaign because they are a profitable market. It is largely an educational job, and last year we worked it for three months and found we could do a lot of selling in low use homes. Low use homes does not necessarily mean low income homes.

We can meet the home maker on her own ground and talk about her problems. We do a much better job of public relations than men do. The women will talk to us more plainly, and even the man in the home will talk more freely than he will to the salesmen or to men who go out to make surveys to find out how the customers feel.

We have increased load through schools, because they have improved schools from just cooking schools to a whole appliance school, and we have built load on that basis.

Of course, we can help the salesman in making his home calls. Very frequently now our salesmen, who objected to us seriously in the beginning, are coming to us to ask help to meet particular problems in homes and help answer those problems for housewives, or to go with them and finally close the sale, and often the girls will meet them on the sales floor for special appointments, so they really have established a fine contact with our sales organization, to help build the Department of Sales for our organization.

Some Progress Towards Electrical Homes

(*Continued from page* 298)

lief that the real electric home will come, at least for us, not through high pressure selling, but by consolidating each step.

We still hold to the value of the steps here listed. May I repeat them. Cordial community relations; loyal employees personally convinced of the soundness of the story they are telling and ready to do all in their power to have permanently satisfied customers; really cooperative dealer relations, recognizing that the burden of maintaining these rests on us; a sound promotional rate structure, and a tradition of voluntary reductions as soon as economically possible; a development of real selling that builds from the ground up, not scorning such minor appliances as bucket cookers and the like; and finally, a sales effort that employs continually all sound methods.

This may seem to you but a reiteration of known facts. I said at the start that we laid no claim to unique methods or brilliant performance. We have enjoyed our fight for progress, we have been discouraged at times, and at times, cheered up and today we face the future confidently, sure that if we never grow self-satisfied in partial attainment, but are continually alert and maintain our efforts we will eventually establish true electric homes with all that they mean in New England.

American Research Committee on Grounding

THE American Research Committee on Grounding met on June 16, 1937, to review the progress made by its Technical Subcommittee since the previous meeting.

The Technical Subcommittee reported that, to initiate its test program, a number of water purveyors operating within a radius of 100 miles of New York had been invited to report cases of water or piping trouble believed or suspected, to be due to electrical grounding, to the subcommittee. The 100-mile limitation was set in order to minimize time and expense in traveling. Letters were sent to 17 water purveyors but no cases have been received in answer to these letters. Twenty-two cases, however, have been reported to individual members of the working subcommittee, and sixteen of them have been investigated by the subcommittee. A number of these were in the territories of water purveyors to whom the invitations were sent. The complaints as reported may be listed as follows:

Sediment in water	2 cases
Blue or green stain	7 "
Rusty water	2 "
Failure of boiler tubes	2 "
Service or house pipe corrosion	4 "
Electric spark	1 case
Taste and odor	1 "
Miscellaneous	3 cases
Total reported	22 cases

None of the investigations is considered as finally completed.

While the field investigation varied with each situation, in general the procedure was as follows:

1. The local water purveyor, the local electric company, and sometimes the local gas company participated in the investigation.
2. The history of the complaint was reviewed and recorded.
3. A record was obtained of the water and gas piping systems involved, including main, service, and house piping. A record was also obtained of the type and condition of the electric services and house wiring involved.
4. Measurements were made and recorded of currents both alternating and direct, at various locations on the premises, with an artificial load where necessary to make adequate measurements.
5. Samples of the water were taken for analysis, where pertinent.
6. Where sediment was found to be involved, a milk filter with cotton discs was used. A definite quantity of water was passed through the filter. The appearance of the disc gave a simple method of determining visually the amount of sediment.
7. Samples of pipe or fittings were obtained, where pertinent.

The development of a technique for these investigations has taken some time, particularly for the earlier cases. In general, one or two visits have been made to each location.

In most of the sixteen cases the cause of the complaint could not be attributed to any single factor. In some of the cases where alternating current was found, removal of the alternating current has not to date substantially altered the manifestation causing the complaint. However, this does not definitely show that alternating current does or does not contribute to the effects but rather that other factors, such as high water temperature of water heaters, galvanic couples due to dissimilar metals in use in plumbing work, and differential aeration, may have been more important in these particular cases.

Where more than one factor contributes to the cause of complaint, the exact part each factor plays in the final result cannot readily be determined in the field. Likewise, the removal of one cause, such as galvanic couples, by the use of insulating bushings, removes other factors as well, such as the flow of alternating current on the section of pipe.

It appears that a laboratory study may lead to the determination of what part such factors may play in causing the complaint, and may permit the field investigators to determine more accurately the exact cause of the complaint.

The committee approved the recommendation of the subcommittee that:

1. A study be made to determine whether or not laboratory investigations would facilitate the investigation and, if so, to prepare for consideration a program of such laboratory tests and means for carrying out these tests.
2. The field investigations be continued. The analysis of sufficient data is necessary to develop methods of testing and good practice in controlling causes of complaint.

In presenting its report, the technical subcommittee pointed out that in none of the cases so far studied are the results to be regarded as final.

Canadian Electrical Association Convention

THE 47th Annual Convention of the Canadian Electrical Association was held at Banff Springs Hotel, Banff, Alberta, June 21-24, 1937. Over 280 delegates from all parts of the Dominion attended.

In his report, Mr. E. H. Adams, Vice-President, British Columbia Electric Railway Co. and President, Canadian Electrical Association, dealt with the progress of the Central Electric Station Industry in Canada during 1936.

Mr. J. E. E. Royer, Vice-President of the Washington Water Power Co., Spokane, Wash., and member of the Executive of the Northwest Electric Light & Power Association addressed the convention on "Tangled Wires."

Mr. Davis M. DeBard of Stone & Webster Service Corp., New York and Chairman of the Sales Committee of the Edison Electric Institute, under the topic "Give the Kilowatt a Crown" stressed the great need of cultivating public good-will.

Mr. Samuel G. Hibben, Director of Applied Lighting of the Westinghouse Lamp Co., Bloomfield, N. J., gave a demonstration talk on "Light Magic."

The Comptroller of Water Rights of the Province of British Columbia, Major J. C. MacDonald, reviewed some "High Lights of the World Power Conference."

A paper by Mr. A. C. Abbott of the Shawinigan Water & Power Co. on "Rural Distribution" was presented.

Mr. Walter E. Potter, General Electric Co., Portland, Oregon, in a paper on "Selling Seeing—Lighting Opportunities for the Utility" gave a stimulating demonstration of the possibilities of lighting as the "number one 'Load Builder' on the utility sales program." "Organization for lighting sales involves the co-ordination of four major elements, Advertising, Promotion, Merchandising and Sales."

The reports of the various committees were presented covering general, engineering and utilization and sales activities.

The new officers of the Association elected for the coming year are:

President—Mr. R. H. Mather, Shawinigan Water & Power Co.; Vice-Presidents—Mr. M. C. Gilman, Winnipeg Electric Co.; J. E. Lawson, Canadian Niagara Power Co.; G. A. Gaherty, Montreal Engineering Co.; Treasurer—J. B. McCabe, Montreal Light, Heat & Power Cons.; Secretary—B. C. Fairchild.

F P C Tells What Utilities Have Done for the Domestic Electric Consumers Since 1924

"RESIDENTIAL electric rates have been declining steadily throughout the period since 1924. The cost of living, on the other hand, held relatively steady until 1930, fell rapidly from then until 1933, and since has increased to some extent.

"The importance of these changes, which almost uniformly have been rate reductions, lies not so much in the savings to consumers which the lower rates made possible, as in the opportunity which has been afforded for increased use of electric energy. To many customers lower rates have indeed meant smaller monthly bills for electric service, but to the great majority they have served to open the way for a more liberal use of energy without a prohibitive increase in the total cost.

"Under the influence of these reductions, along with other factors, such as the development of moderately priced and more efficient appliances, the consumption of energy for residential purposes has increased steadily during the entire period from 1924 to 1936, and at a particularly rapid pace since 1934. During 1935 and the first half of 1936 the sales of appliances using large amounts of energy have exceeded the records of the best predepression years. With lower rates, consumers are coming to rely to an increasing extent on electric service for refrigeration, cooking and heating, as well as a variety of other services, and the importance of electric service to them is increasing visibly from month to month."—*"Trends in Residential Rates from 1924 to 1936" Federal Power Commission, June 1937, page 33.*

Growing Uniformity in Residential Electric Rates

"BETWEEN 1924 and July 1, 1936, rates have not only been materially reduced but they have also become more nearly equal as between cities. This is a consequence of the larger reductions made in cities with high bills in 1924 in contrast with the smaller decreases in bills that were relatively low. . . .

"Comparisons between cities of the changes in typical bills, therefore, must take into consideration the original amounts of those bills. If the bills were much above the average in 1924, large reductions may be an indication of belated progress toward a level of rates already to be found in other cities at the beginning of the period. Some cities had lower bills throughout the period from 1924 to 1936 than other cities had at the end of the period after heavy reductions from much higher bills in the earlier years. The charges in the former cities cannot be compared unfavorably with charges in the latter merely because the reductions in the bills during the interval were not as large."—*"Trends in Residential Rates from 1924 to 1936" Federal Power Commission, June, 1937. Pages 23 and 31.*

Private Utilities Making Rate Reductions 8 Times as Rapidly as Municipal Plants

"IT is interesting to note the residential consumers in 126 cities of the total number of 191, or 66.0 per cent, have a lower bill or bills as of January 1, 1936, than were charged January 1, 1935. These reductions were made by 95 utilities, or 61.3 per cent of the total. 7.4 per cent of the publicly owned utilities made reductions as compared with 92.6 per cent of the privately owned utilities."

Number of rate reductions in 3 periods. Data for 150 cities of 50,000 or more inhabitants.

Period	Length of period in years	Total number of rate reductions	Average number of rate reductions per year
Oct. 1, 1924-Oct. 1, 1928	4	159	40
Oct. 1, 1928-Oct. 1, 1932	4	170	42
Oct. 1, 1932-July 1, 1936	3.75	221	59

"Trends in Residential Rates from 1924 to 1936"—Federal Power Commission. Released June 28, 1937—pages 1 and 23.

—Trends in Residential Rates from 1924 to 1936"—Federal Power Commission. Released June 28, 1937—pages 1 and 23.

Frankness in re the New Regional TVA Bill

"Mr. President, the question which will be involved in connection with the consideration of the bill is not a question of navigation, although that is the constitutional peg on which the proposed legislation hangs. It is not going to be a question of flood control, although that is a question which under the Constitution we are privileged to deal with."—*Senator Norris in Debate Upon Reference to Senate Committee of His Bill Creating Regional Conservation Authorities. Cong. Record, June 8, 1937, page 7078.*

Achievements of Private Electrical Enterprise as Seen by British

ON the technical side the record of private enterprise in the (U. S.) power industry is one of unparalleled achievement both in generation and distribution. It has raised the standard at the same time as it has lowered the cost of living. It is the exceptional position among United States industries of having in 1936 a larger output, larger sales, larger plant capacity, and more customers than in 1929 or any other year. Moreover although by the summer of 1936 total revenues exceeded those of November, 1929, the previous best month in the history of the industry, the general tendency in the average price of energy during recent years has been downward and the average cost per kilowatthour is now the lowest on record. The supply of cheap electricity to domestic consumers, the average charge for which has been reduced by 21 per cent since 1929 or by far more than to other classes of consumers, has rendered a great social service by introducing electrical amenities and labor-saving appliances into millions of homes in addition to creating a flourishing electrical appliance industry, while completing the beneficent circle the reduction of domestic rates which brought about increased consumption in turn made possible the maintenance of the lower rates.—*"Report on Economic and Commercial Conditions in the United States of America," by H. O. Chalkley, Commercial Counsellor to the British Embassy at Washington, December, 1936. (Pub. No. 663 Department of Overseas Trade, London, p. 133.)*

PUBLICATIONS OF THE INSTITUTE

Pub. No.		*Date Issued*	*Price to Members*	*Price to Non-Members*	*Price to Foreign Countries*
E1	Rectifier Wave Shape	(4/37)	$0.40	$1.00	$1.10
E2	The Electric Light and Power Industry in 1936	(1/37)	.30	.75	.85
E3	Jointly Used Wood Pole Lines Specifications	(1/37)	.50	1.50	1.60
E4	Joint Use of Poles, 6.6 and 13.2 kv, Safety Features	(1/37)	.30	.75	.85
E5	Principles and Practices for Inductive Coordination, A.A.R. and E.E.I.	(1/37)	n. c.	n. c.	n. c.
E8	A-C Network Operation—1934-1935	(6/37)	.70	1.60	1.75
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D5	Power Station Chemistry—1936	(7/36)	.20	.50	.55
D6	Boilers, Economizers, Air Heaters and Piping—1936	(9/36)	.60	1.50	1.60
D7	Combustion, 1936	(10/36)	.60	1.50	1.60
D8	Superposition of High Pressure Non-Condensing Equipment on Existing Power Stations	(10/36)	.25	.65	.75
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D11	Turbines, Condensers, Feedwater Heaters and Pumps—1936	(11/36)	.60	1.50	1.60
D12	Air Conditioning—1936	(11/36)	1.20	3.00	3.15
D13	Engineering Reports of the Joint Subcommittee on Development and Research—Vol. III	(1/37)	5.00	10.00	10.00
D14	Engineering Reports of the Joint Subcommittee on Development and Research—Vol. IV	(1/37)	5.00	10.00	10.00
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C5	Turbines, Condensers and Feedwater Heaters—1935	(7/35)	.40	1.00	1.10
C6	Combustion—1935	(8/35)	.80	2.00	2.15
C7	Air Conditioning—1935	(9/35)	.50	1.25	1.35
C8	Oil and Gas Engines—1934-1935	(10/35)	.50	1.25	1.35
C9	Methods of Measuring Radio Noise	(11/35)	.15	.35	.45
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B5	Station Piping—1934	(7/34)	.60	1.50	1.60
B7	Oil and Gas Engines	(8/34)	.40	1.00	1.10
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B12	A-C Network Operation—1932-1933	(12/34)	.40	1.00	1.10
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A14	Current Carrying Capacity of Impregnated Paper Insulated Cable	(7/33)	.25	.65	.85
A16	Load and Revenue Forecasting	(7/33)	.30	.75	.85
A17	Promotion of Home Air Conditioning	(8/33)	.20	.50	.60
A19	Hydraulic Governors	(8/33)	.20	.50	.60

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POWER SALES ITEMS

AIR CONDITIONING

"Rayon and Air Conditioning," by L. L. Lewis. *Heating, Piping & Air Conditioning,* June, 1937, p. 347. Keeney Publishing Co., Publishers, 6 North Michigan Ave., Chicago, Ill.

How rayon is made. . . . Air conditioning requirements of the process.

"Technical Groups Formulate Air Conditioning Code Recommended for Wisconsin." *Heating & Ventilating Magazine,* June, 1937, p. 43. The Industrial Press, Publishers, 148 Lafayette Street, New York City.

"63 Individual Ducts Serve Air Conditioned Spaces in Windowless Building," by R. E. Hattis. The National Aluminate Corporation, Chicago. *Heating & Ventilating Magazine,* June, 1937, p. 31. The Industrial Press, Publishers, 148 Lafayette Street, New York City.

"Weather in the House," by Laurence Wray. *Electrical Merchandising,* May, 1937, p. 190. McGraw-Hill Publishing Co., Inc., Publishers, 330 West 42nd Street, New York City.

Air conditioning is electricity's latest and most dramatic contribution to health and comfort in the modern home.

DIESEL ENGINES

"Combined Diesel-Steam Plant at New York University," by Andrew I. Peterson. *Diesel Power,* May, 1937, p. 326. Diesel Publications, Inc., Publishers, 192 Lexington Avenue, New York City.

Description of the plant which contains one steam turbine and three Diesel engines to provide both steam and power for University buildings.

"LaPorte City, Iowa, Starts Its Municipal Diesel Plant," by C. Maxwell Stanley. *Diesel Power,* May, 1937, p. 332. Diesel Publications, Inc., Publishers, 192 Lexington Avenue, New York City.

Description of the Diesel plant which has been responsible for a very considerable increase in sales of electrical energy and a decrease in the average revenue.

ELECTRIC FURNACES

"Heat Treating Furnace Specifications," by Norman C. Bye, Henry Disston & Sons, Inc., Philadelphia, Pa. *Iron & Steel Engineer,* May, 1937, p. 27. Association of Iron and Steel Engineers, Publishers, 1018 Empire Building, Pittsburgh, Pa.

Greater temperature control can be obtained by making a closer study of the effect of mass and time, and laying less stress on extreme accuracy of temperatures.

"A Six-Ton Induction Furnace," by Herr Boer. *Metal Progress,* June, 1937, p. 621. American Society for Metals, Publishers, 7016 Euclid Ave., Cleveland, Ohio.

An abstract from Siemens Zeitschrift describing the largest unit built by Siemens and Halske.

ELECTRIC HEATING

"Melting and Annealing of Electrical Alloys," by D. F. Miner and J. B. Seastone, Westinghouse Electric & Manufacturing Co. *Metal Progress,* June, 1937, p. 611. American Society for Metals, Publishers, 7016 Euclid Avenue, Cleveland, Ohio.

The part that electricity plays in solving some special and difficult metallurgical problems.

"Industrial Electric Heating," by N. R. Stansel. *General Electric Review,* May, 1937, p. 246. General Electric Company, Publishers, 1 River Road, Schenectady, N. Y.

Transformers and reactors for three-phase arc furnaces.

INDUSTRIAL ELECTRIFICATION

"Cement Plants Modernize the Electrical Way," by Viggo Sahmel, F. L. Smith & Co., New York City. *Electrical World,* May 8, 1937, p. 46. McGraw-Hill Publishing Co., Inc., Publishers, 330 West 42nd Street, New York City.

Quality is improved through use of modern electrical equipment.

"Electrogalvanized Wire Gives Corrosion Defiance," by W. C. Frank and W. E. Miller, Bethlehem Steel Company, Johnstown, Pa. *Electrical World,* June 19, 1937, p. 32. McGraw-Hill Publishing Co., Inc., Publishers, 330 West 42nd Street, New York City.

General description of the process which provides ductility, bond and toughness with high purity coating

"Industrial Electrification." *Electrical World,* June 19, 1937, p. 74. McGraw-Hill Publishing Co., Inc., Publishers, 330 West 42nd Street, New York City.

Four items which contain ideas for power sales:

Electric boilers use off-peak power.
Furnaces dry coating on filament thread.
Miniature breakers out-last man-hours.
$3,700 saved by electric welding.

"Industrial Electrification." *Electrical World,* May 8, 1937, p. 76. McGraw-Hill Publishing Co., Inc., Publishers, 330 West 42nd Street, New York City.

Four items which contain ideas for power sales:

Huge induction motor starts across line.
Electric power in the oil fields.
Furnace control cuts power costs.
Positions welds of heavy parts.

"Industrial Electrification." *Electrical World,* May 22, 1937, p. 146. McGraw-Hill Publishing Co., Inc., Publishers, 330 West 42nd Street, New York City.

Three items which contain ideas for power sales:

Electric tunnel kiln is popular in Europe.
Serve dredge motor over floating line.
Builds tug in 90 days with arc welding.

LIGHTING

"Industry Lighting Studies. . .Printing," by Dean Warren. *Factory Management & Maintenance,* June, 1937, p. 64. McGraw-Hill Publishing Co., Inc., Publishers, 330 West 42nd St., New York City.

First of several studies made in selected industries by the Illuminating Engineering Society. Studies in the shoe and textile industries will appear in early issue.

"Researches on Industrial Lighting. Report on Lighting in the Candy Manufacturing Industry." Transactions of the *Illuminating Engineering Society,* May, 1937, p. 483. Illuminating Engineering Society, Publishers, 51 Madison Avenue, New York City.

"What Good Lighting Means to Industrialists," by Dean M. Warren and A. K. Gaetjens, General Electric Co., Cleveland, Ohio. *Electrical World,* June 19, 1937, p. 42. McGraw-Hill Publishing Co., Inc., Publishers, 330 West 42nd Street, New York City.

Results obtained after improved lighting was instaled in eight representative factories.

LOAD BUILDING

"Planning the Growth of Industrial Load," by A. D. McLay. *Electrical World,* May 22, 1937, p. 1784. McGraw-Hill Publishing Co., Publishers, 330 West 42nd St., New York City.

A study of load curves and company facilities indicates the directions to be taken in building industrial load. Equipment builders should cooperate with load builders and system builders.

"Selective Market Expansion Rests on Customer Analysis," by G. J. Read. *Electrical World,* May 22, 1937, p. 1774. McGraw-Hill Publishing Co., Inc., Publishers, 330 West 42nd Street, New York City.

Scientific statistical scrutiny of buying power needed to forecast amount, location, character of future electrical patronage.

"Organization and Methods in Industrial Sales," by F. T. Brooks. *U. G. I. Circle,* June, 1937, p. 22. United Gas Improvement Co., Publishers, 1401 Arch St., Philadelphia, Pa.

POWER PLANTS

"An Industrial Plant Increases Power Capacity," by A. B. Snavely. Hershey Chocolate Corporation. *Electrical Journal,* May, 1937, p. 181. Electrical Journal, Publishers. 530 Fernando Street, Pittsburgh, Pa.

STRIP MILLS

"Hot and Cold Strip Mills—Granite City Steel Co.," by Hayward Niedringhaus, President. *Iron & Steel Engineer,* May, 1937, p. 38. Association of Iron and Steel Engineers, Publishers, 1018 Empire Bldg., Pittsburgh, Pa.

Description and plan view of the new mills at Granite City.

WIRE MILLS

"New Wire Mill—Republic Steel Corporation." *Iron & Steel Engineer,* May, 1937, p. 36. Association of Iron and Steel Engineers, 1018 Empire Bldg., Pittsburgh, Pa., Publishers.

New wire mill which was developed to meet the special needs of rural markets.

Opportunities for Youth

(*Continued from page 272*)

not expect to make a fortune, although they can expect to be paid well and liberally for their services.

On the other hand, the electrical industry offers certain rewards that cannot be measured in terms of dollars and cents. The very nature of its business, a public service supplying basic needs of humankind, presents opportunities that bring their own rewards. In my opinion, the young man with such ideals will find more rapid progress awaiting him in this field of endeavor than in any other line of business I know. And there is, furthermore, assurance of this fact because the industry today has a clearer concept of its responsibility to the public as well as a greater appreciation of the close relationship that our business bears to the social and economic progress of the nation.

Whether or not we shall be able to carry out our part in the scheme of things will depend largely upon the attitude of those who in recent times have so centered public attention upon the abuses in the industry that they have actually concealed the remarkable record of its achievements. As moderation replaces acerbity — and this we have a right to expect — the industry will again move forward in an ever-widening field of usefulness. Great opportunities certainly lie ahead for the young men who shoulder these responsibilities. With intelligent aggressiveness, with a better and clearer understanding of the human problems involved, they will fulfill that greater destiny toward which those who have conscientiously done their part in the building of these great enterprises, have themselves so earnestly striven.

CONVENTIONS AND MEETINGS

SEPTEMBER

8-10 Pennsylvania Electric Association, Bedford Springs Hotel, Bedford Springs, Pa.

13-14 Wisconsin Utilities Association, Transportation Section, Lawsonia Hotel, Green Lake, Wis.

24-25 Wisconsin Utilities Association, Accounting Section, Lawsonia Hotel, Green Lake, Wis.

27-30 American Gas Association, Cleveland, Ohio.

27-30 Illuminating Engineering Society, Greenbrier Hotel, White Sulphur, W. Va.

OCTOBER

1 American Gas Association, Cleveland, Ohio.

11-12 Electrical Equipment Committee, Chamber of Commerce Grill, Terminal Tower Building, Cleveland, Ohio.

12-13 Transmission and Distribution Committee, Chamber of Commerce Grill, Terminal Tower Building, Cleveland, Ohio.

21-23 Indiana Electric Association, French Lick Springs Hotel, French Lick Springs, Ind.

Northwest Association Elections

W. C. MAINWARING of the B. C. Electric Railway Co., Vancouver, was elected president of the Northwest Electric Light & Power Assn. at its 30th annual meeting at Portland, Ore., July 9. He succeeds George M. Gadsby, Utah Power & Light Co., Salt Lake City, who held the position during the past year. LeRoy A. Grettum, Eastern Oregon Light & Power Co., Baker, was elected vice-president.

Vice-presidents for the several states were elected as follows: Idaho, K. M. Robinson, Idaho Power Co., Boise; Montana, F. W. Bird, The Montana Power Co., Butte; Oregon, A. C. McMicken, Portland General Electric Co., Portland; Utah, P. M. Parry, Utah Power & Light Co., Salt Lake City; Washington, Frank Walsh, Puget Sound Power & Light Co., Bellingham; British Columbia, E. H. Adams, B. C. Electric Railway Co., Vancouver.

The following were elected to the executive committee: George T. Bragg, Pacific Power & Light Co., Portland; George A. Boring, General Electric Supply Corp., Portland; and Millard Sebern, Fowler Manufacturing Co., Portland. J. E. E. Royer, The Washington Water Power Co., Spokane, carries a hold-over term on the committee as does the retiring president.

Immediately following the meeting the new president appointed R. W. Lawlor, Northwestern Electric Co., Portland, treasurer; Berkeley Snow of Portland, executive secretary; and the following Section chairmen: Accounting and Business Practice Section, C. E. Gieseker, The Washington Water Power Co., Spokane; Business Development Section, R. E. Gale, Idaho Power Co., Boise; and the Engineering & Operation Section, A. Vilstrup, B. C. Electric Railway Co., Vancouver.

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terval from three to six months increases the failures to operate per 100 protectors per year from 2.7 to 5.9. If the inspection interval is extended to one year, the failure rate is 8.6, and for inspection intervals of two years and over the failure rate is 14.7.

The conclusions reached and the tabulated data presented in this report should be accepted with the full realization that, due to the wide variation in size of network areas and the number of units of equipment in service in an area any relative data based upon percentages of companies reporting do not necessarily present a correct picture of the use being made of the equipment and should be accepted with the reservation that such data only indicate the relative opinions of practices of groups of engineers and operators responsible for individual or groups of low voltage A-C networks regardless of the size of the network area.